

LOW DENSITY RADIO COMMUNICATIONS LINK
PROJECT IMPLEMENTATION PLAN



July 27, 1993

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

Distribution: A-W(NC/SM/SE/TR/HT)-2; A-Y(AY/DE)-2;
A-Z(CN)-3; A-X(AF/AT)-3; A-FAF-7(STD);
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Initiated By: ANC-400

RECORD OF CHANGES

DIRECTIVE NO.

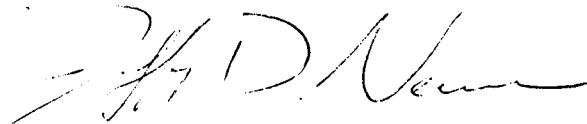
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FOREWORD

This order provides technical guidance and management direction for the orderly implementation of the Low Density Radio Communications Link (LDRCL) project. This order identifies and describes specific requirements, events, tasks, and activities to be accomplished, as well as project implementation procedures, and organizational and project management responsibilities that are necessary to implement the project. Management responsibility for this project is assigned to the Interfacility Communications Program Office, ANC-400. Support and cooperation by all other organizations involved in the LDRCL project is essential for successful deployment of the LDRCL equipment.

The goal of this order is to provide a uniform approach for all organizations that have a role in conducting activities necessary to implement any portion of this project. The procedures and responsibilities in this order were developed using current agency directives, and the format and content are prepared as specified in FAA-STD-036, Preparation of Project Implementation Plans, and Order 1320.1D, FAA Directives System.



Michael Shveda
Program Manager for Interfacility
Communications, ANC-400

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CHAPTER 1. GENERAL

1. **PURPOSE.** This order provides the Project Implementation Plan (PIP) for the Low Density Radio Communications Link (LDRCL) project and presents an orderly site implementation process for LDRCL equipment. The PIP establishes program management, implementation procedure and responsibilities governing the activities of the LDRCL project organization. The PIP identifies the activities and schedules required to accomplish project implementation. This PIP is organized and presented in accordance with FAA-STD-036, Preparation of Project Implementation Plans.

2. **DISTRIBUTION.** This order is distributed at the division level to the office of the Program Director for Communications and Aircraft Acquisition, Systems Maintenance, NAS System Engineering, and Air Traffic Plans and Requirements Services, and the Office of Training and Higher Education; to the division level in the FAA Academy and the FAA Logistics Center at the Mike Monroney Aeronautical Center; to the branch level at the Engineering, Test and Evaluation Service at the FAA Technical Center; to the branch level in the Airway Facilities and Air Traffic divisions; and a standard distribution to all Airway Facilities Sectors, sector field offices, sector field units, and sector field office units and Air Traffic field offices.

3. **DEFINITIONS.** A list of technical definitions is contained in appendix 1. The following abbreviations and acronyms, used throughout this order, are provided as follows:

| | |
|--------|---|
| ACORN | Automated Checkout and Recording Equipment |
| AFSS | Automated Flight Service Station |
| ANMS | Automated Network Monitoring System |
| AP | Acquisition Plan |
| APMC | Associate Program Manager for Contracting |
| APMC-D | Associate Program Manager for Contracting - DECCO |
| APME | Associate Program Manager for Engineering |
| APMGC | Associate Program Manager for Legal |
| APML | Associate Program Manager for Logistics |
| APMP | Associate Program Manager for AT Procedures |
| APMQ | Associate Program Manager for Quality |
| APMR | Associate Program Manager for AT Requirements |
| APMSE | Associate Program Manager for System Engineering |
| APMSM | Associate Program Manager for Systems Maintenance |
| APMT | Associate Program Manager for Test and Evaluation |
| ARSR | Air Route Surveillance Radar |
| ASR | Airport Surveillance Radar |
| ATCT | Airport Traffic Control Tower |
| CAI | Contractor Acceptance Inspection |
| CCB | Configuration Control Board |
| CDR | Critical Design Review |

| | |
|-------|---|
| CDRL | Contract Data Requirements List |
| CIP | Capital Investment Plan |
| CJE | Critical Job Element |
| CM | Configuration Management |
| CMT | Core Matrix Team |
| CMTF | Contractor Master Test Plan |
| COTR | Contracting Officer's Technical Representative |
| COTS | Commercial Off-the-Shelf |
| DECCO | Defense Commercial Communications Office |
| DFR | Detailed Financial Review |
| DISA | Defense Information System Agency |
| DMN | Data Multiplexing Network |
| DOD | Department of Defense |
| DPA | Delegation of Procurement Authority |
| DRR | Deployment Readiness Review |
| DS-1 | Digital Service |
| DTE | Data Terminal Equipment |
| DT&E | Developmental Test and Evaluation |
| DTDM | Deterministic Time Division Multiplexing |
| DTL | Direct-to-Line |
| ECP | Engineering Change Proposal |
| EM | Element Manager |
| EMI | Electro-Magnetic Interference |
| EXCOM | Executive Committee |
| FAA | Federal Aviation Administration |
| FAR | Federal Acquisition Regulations |
| FAT | Factory Acceptance Test |
| FBCN | Financial Baseline Change Notice |
| FCA | Functional Configuration Audit |
| FIRMR | Federal Information Resources Management Regulation |
| FMS | Financial Management System |
| FTE | Full Time Equivalent |
| FY | Fiscal Year |
| F&E | Facilities and Equipment |
| GAO | Government Audit Office |
| GSA | General Services Administration |
| GSBCA | General Services Board of Contract Appeal |
| ICD | Interface Control Document |
| IFSS | International Flight Service Station |
| IFST | IFSS Transmitter Service |
| ILSP | Integrated Logistics Support Plan |
| IOT&E | Independent Operational Test and Evaluation |
| IRD | Interface Requirements Document |
| ITP | Integration Test Plan |
| JAI | Joint Acceptance Inspection |
| KDP | Key Decision Point |
| LDRCL | Low Density Radio Communications Link |
| LIS | Logistics and Inventory System |
| LRU | Line Replaceable Unit |
| LSA | Logistics Support Analysis |
| MA | Major Acquisition |
| MHZ | Mega Hertz |
| MNS | Mission Need Statement |

| | |
|---------|---|
| MOU | Memorandum of Understanding |
| MSA | Major System Acquisition |
| MSS | Master Scheduling System |
| MTP | Master Test Plan (Project) |
| MTTR | Mean Time To Repair |
| NADIN | National Airspace Data Interchange Network |
| NAILS | National Airspace Integrated Logistics Support |
| NAILSMT | NAILS Management Team |
| NAS | National Airspace System |
| NCP | NAS Change Proposal |
| NDI | Non-Developmental Item |
| OMB | Office of Management and Budget |
| OPS | Operations |
| ORD | Operational Readiness Demonstration |
| OT&E | Operational Test and Evaluation |
| OT&E/I | OT&E/Integration |
| OT&E/S | OT&E/Shakedown |
| PA | Project Authorization |
| PDSR | Program Director's Status Review |
| PCA | Physical Configuration Audit |
| PD | Program Directive |
| PDR | Preliminary Design Review |
| PIP | Project Implementation Plan |
| PM | Program Manager |
| PMP | Program Master Plan |
| PR | Procurement Request |
| PRR | Procurement Readiness Review |
| RCAG | Remote Communications Air/Ground |
| RCL | Radio Communications Link |
| RCR | Routing and Circuit Restoral |
| RFP | Request for Proposal |
| RPM | Regional Program Manager |
| RPMS | Regional Program Management System |
| SEB | Source Evaluation Board |
| SLSR | Senior Level Status Review |
| SOW | Statement of Work |
| SP | Selection Plan |
| SRB | Specification Review Board |
| TM&O | Telecommunications Management and Operations |
| TOR | Technical Onsite Representative |
| TPL | TSARC Program List |
| SRS | Systems Requirements Statement |
| STDM | Statistical Time Division Multiplexing |
| T&E | Test and Evaluation |
| TD | Test Director |
| TPRB | Test Policy and Planning Review Board |
| TPRC | Test Policy and Planning Review Committee |
| TRACON | Terminal Radar Approach Control |
| TSARC | Transportation Systems Acquisition Review Council |
| TSR | Telecommunications Service Request |
| VOR | Very High Frequency Omnidirectional Range |
| VRTM | Verification Requirements Traceability Matrix |

4. **AUTHORITY TO CHANGE THIS ORDER.** The Program Manager for Interfacility Communications Programs, ANC-400, may issue changes to this order which are necessary to manage and implement the project and which do not affect policy, delegate authority, or assign responsibility.

5.-19. **RESERVED.**

CHAPTER 2. PROJECT OVERVIEW

20. **SYNOPSIS.** The LDRCL project, CIP 45-05, is one of three projects which comprise the overall Radio Communications Link Network. The other two link projects are the Radio Communication Link (RCL) Backbone and the Routing and Circuit Restoral (RCR) System. The initial phase of each of these projects together comprise the Radar Microwave Link (RML) Replacement/Expansion program, Capital Investment Plan (CIP) 25-03 which was approved in 1984. The second phase of each of these three projects is a separately identified CIP project. The LDRCL project is divided into two phases.

a. Phase I of the project will complete the connections to the RCL Backbone. This phase involves approximately 50 separate LDRCL systems or links.

b. Phase II (CIP 45-05) will provide diversity for critical and essential voice and data services in the National Airspace System (NAS), as well as connectivity where leased services are not available. The number of Phase II systems are not as yet defined.

21. **PURPOSE.** The LDRCL is a joint ANC-400/Telecommunications Management and Operations Division, ASM-300, acquisition which provides state-of-the-art microwave communications systems/equipment for low to medium density transmission capacity requirements. It provides diversity for critical and essential voice and data services in the NAS, and it provides connectivity where leased services are not available. Additionally, LDRCL offers a cost efficient telecommunications alternative to leased communications services and will fulfill the requirement in meeting the Major System Acquisition (MSA) commitment for RML replacement of obsolete microwave transmission equipment. The LDRCL will be used to connect remote sites, such as an Air Route Surveillance Radar (ARSR), Airport Surveillance Radar (ASR), Remote Communications Facility (RCF), VHF Omnidirectional Range (VOR), or Automated Flight Service Station (AFSS) to the facilities served by the RCL backbone network, or as a point-to-point medium between the remote facilities and their primary users. The LDRCL will also interconnect control facilities such as an Airport Traffic Control Tower (ATCT), Air Route Traffic Control Center (ARTCC), Metroplex Control Facilities (MCF), or a Terminal Radar Approach Control Facility (TRACON) to their surrounding remote facilities. A portion of the LDRCL procurement will also be used to satisfy the requirements to provide interconnectivity via metro-net and the inter-control area between the ACF and its associated remote sites in an advisory area.

a. **Phase I.** This phase provides for the replacement of low capacity, obsolete (RML) systems. Equipment procurement funding is the responsibility of ANC-400 during this phase.

b. **Phase II.** Phase II systems will provide expanded diversity to the NAS for critical and essential voice and data services. Phase II provides interfacility communications where it is economically

advantageous or where enhanced reliability is required when compared to leased service or where leased service does not exist. Equipment procurement funding is the responsibility of ASM-300 during this phase.

22. **HISTORY.** The current radio link system, initially established 25 years ago to route broadband radar data to ARTCC's, is being modernized under the Radar Microwave Link (RML) Replacement/Expansion program documented in the CIP. The system was further expanded and modernized under the RML Replacement/Expansion program, further described in the NAS System Specification document, NAS-SS-1000. The system is described as the backbone network of the NAS Interfacility Communications System (NICS), and provides long-haul voice and data connectivity between the ARTCC's and some major air traffic control facilities, and is identified as the RCL. In addition to this high-density interfacility backbone network, there are short-haul user access microwave links, and leased line remoting circuits that provide connectivity between centralized facilities (e.g., ATCT, AFSS) and remote facilities (e.g., ARSR, ASR, VOR), and the connectivity among those centralized facilities not provided for by the RCL backbone system (e.g., ATCT, TRACON, ASR). Many of these local area network RML systems utilize the same vintage equipment as the microwave link systems undergoing replacement, but were not included as part of the replacement effort. These are generally stand-alone systems that provide connectivity among centralized facilities and do not interface with the RCL backbone network. Where leased lines are used for local area network communications, cost containment and service improvements at some locations are visualized through the use of LDRCL. These circuits are either configured as a spur link to the RCL backbone network, provide facility-to-facility connectivity, or tie into metro-nets, airport telecommunications loops or user access networks. All of these local area networks are candidates for equipment under the LDRCL project.

23. **PROJECTED CAPABILITY.** The LDRCL transmission equipment consists of two microwave terminals, and when necessary, repeater stations to provide the connectivity between FAA facilities. The four types of microwave systems provided are listed in subparagraphs 23a - 23d.

a. **Ultra High Frequency (UHF) Equipment.** The analog (UHF) (932-945 MHz) system is suitable for point-to-point applications with line of sight paths up to approximately 60 miles. Equipment capacity is one analog voice channel which may be increased to 12 voice channels by adding direct-to-line (DTL) analog multiplexers.

b. **1.8 GHz Digital Equipment.** The 1.8 GHz digital system is suitable for applications with line of sight paths up to approximately 35 miles. The digital equipment design provides a maximum capacity of up to eight DS-1 channels or 196 circuits.

c. **1.8 GHz Analog Equipment.** The 1.8 GHz analog system is suitable for applications with line of sight paths up to approximately 35 miles. The analog equipment design uses DTL multiplexers to provide a maximum capacity of 132 voice channels.

d. **23 GHz Equipment.** The 23 GHz digital system is suitable for short-range application and operation in a locality where frequency congestion is not a problem. Confident transmission is limited to less than 10 miles. The 23 GHz equipment provides a maximum capacity of 8 DS-1 channels or 196 circuits.

24. **PROJECT ACQUISITION STRATEGY.** The LDRCL Contract DCA 200-91-D-0022, is a requirements contract which offers four commercial-off-the-shelf (COTS) microwave system designs, was awarded on April 4, 1991, to Rockwell International, Collins International Service Company (CISCO), under full and open competition. CISCO was purchased by Alcatel in 1992.

a. **Ordering Equipment.** Under the terms of the LDRCL contract, equipment may be ordered for a period of 7 years, one base year and six option years. Equipment may be purchased outright or may be leased via either a 36-month lease-to-ownership plan (LTOP), or a long-term (up to 120 months) lease with option to purchase (LWOP) plan.

b. **Contractor Services.** Additionally, the following contractor services are available under the LDRCL contract for a period of up to 10 years:

(1) **Path Analysis Services.** The contractor shall furnish path analysis services as a part of the site survey of each microwave hop in accordance with the specification requirements. The Contractor shall submit a path analysis and comprehensive installation and integration plan to the Government for approval not later than 45 days after receipt of the path analysis order.

(2) **Installation Services.** The contractor shall deliver, install, integrate, test and activate the LDRCL equipment as ordered by the Government. The contractor shall furnish all qualified labor, supervision, materials, equipment, and tools required to accomplish each turnkey installation.

(3) **Engineering Support Services.** The contractor will provide engineering support service to assist the FAA in accomplishing tasks required in the planning, implementation, and maintenance of the LDRCL equipment.

(4) **Telephone Advisory Service.** When ordered, the contractor will provide guidance and assistance to the field technicians to aid in solving maintenance related problems. The service will be available via a toll free phone number 24 hours a day, seven days a week.

25. **TEST AND SITE PREPARATION STRATEGY.** Each of the four different LDRCL systems will be tested at the FAA Technical Center and at a designated primary test site. The primary test sites are listed below:

| <u>Link Locations</u> | <u>Equipment Type</u> |
|---------------------------------|-----------------------|
| Miami ARTCC to Miami IFST | 1.8 GHz Digital |
| Missoula Radar to Miller's Peak | 1.8 GHz Analog |
| Mina RCAG to Tonapah Radar | 900 MHz Analog |
| Tucson ATCT to Tucson TRACON | 23 GHz Digital |

These four installations will serve as test facilities where FAA Technical Center and other program personnel will perform all required operational equipment and system testing in a field environment. The tests to be performed at these sites are discussed in detail in both the System Field Acceptance Test Plan and the FAA LDRCL Master Test Plan. A path analysis will be ordered for each microwave link. It will be delivered to the FAA for review by each site manager and the Regional Associate Program Manager. This survey is delivered in the form of a Path Analysis and Installation and Integration Plan, (CDRL A006). The content of CDRL A006 is described in subparagraphs 25a - 25d.

a. **Site Survey.** The site surveys, coordinated through the regional LDRCL Associate Program Managers, will describe the present material condition of each site and make specific recommendations for required upgrades and repairs. No site survey will be conducted without the presence of a FAA facilities and equipment (F&E) representative who has the authority to make decisions with respect to site preparation, installation, and integration. The site survey will evaluate the use of existing equipment in support of the LDRCL system scheduled for installation. If the site survey reveals a requirement for the acquisition of any real property or the expansion of existing facilities, this land acquisition effort must be coordinated through the regional real estate branch offices (AXX-56's).

(1) **Initiate Real Property Site Selection.** When real property must be acquired to support implementation of an acquisition program, the program manager shall task the regions to conduct joint site-selection visits by regional engineering and real-property personnel to identify the best facility site based on operational, environmental, and economic factors. After site selection, a lease versus purchase analysis is made by the regional real property office. The program manager shall ensure these activities are programmed and funded with sufficient lead time to acquire and prepare real property before the scheduled deployment date of the product.

(2) **Prepare Environmental and Hazardous Materials Audit Statement.** Once a site is selected, but before beginning acquisition, the regional Airway Facilities office shall complete the hazardous materials testing report (environmental due diligence audit) and environmental assessment statement (environmental impact statement or findings of no significant impact, as appropriate). The regional Airway Facilities division manager approves both the hazardous materials audit report and the environmental assessment statement.

b. **Path Analysis.** A path analysis shall be conducted to evaluate the microwave link and the associated microwave path to and from each site in the link. The path analysis will discuss tower heights, height of Antenna Center Line (ACL), and tower loading, equipment types, and Electro-Magnetic Interference (EMI), quantities and location. All path calculations will be presented for review.

c. **Installation Plan.** The installation plan shall define equipment location, floor plan showing LDRCL equipment footprint, power and demarcation connections, grounding, antenna, and transmission line locations and mounting.

d. **Integration Plan.** All site preparation work required to prepare the site for installation of equipment shall be identified and a priced proposal shall be included. Completion of the test schedule and the major milestones, including the Deployment Readiness Review (DRR), will signal FAA approval of each of the four basic LDRCL system types. Upon completion of the Joint Acceptance Inspection, for each of the four test systems, installation will begin on the remaining phase I and phase II microwave links. The maximum rate which equipment may be ordered is sixteen (16) sites per month.

26. **INTEGRATED LOGISTICS SUPPORT STRATEGY.** The LDRCL project's logistics strategy as outlined in subparagraphs 26a -26e is described in-depth in the LDRCL Integrated Logistics Support Plan (ILSP) which has been developed and promulgated by the NAILS Implementation Branch, ANS-420.

a. **Maintenance Concept.** The LDRCL is to be supported by two levels of maintenance - site-level maintenance and depot-level maintenance - reenforced by 2nd echelon engineering support services. Throughout the life of the LDRCL contract the contractor will make available, if and when ordered by the Government, varying degrees of Contractor Maintenance and Logistics Support (CMLS).

b. **Supply Support.** There are three locations, or levels, at which supplies and material required for support of LDRCL equipment maintenance may be stored; the site, other centralized locations specified within the regions, and the FAA Logistics Center (FAALC). Provisioning requirements for each will be defined at the Provisioning Conference. Provisioning of LDRCL equipment will be performed down to the Line Replaceable Unit (LRU) level.

c. **Training.** The LDRCL training program will consist of four modularized training packages, one module for each of the four different hardware types being installed throughout the country. This instruction includes hands-on training for site operation and maintenance of all installed LDRCL equipment to the LRU level.

d. **Test and Measuring Equipment.** A complete list of the support and test equipment required to maintain the LDRCL equipment is contained in the LDRCL ILSP. This list was provided by the contractor and shall be reviewed by the Technical Standards Branch, ASM-120, for applicability to specific LDRCL sites.

e. **Technical Manuals.** COTS Instruction Books, technical manuals, and drawing and schematics have been provided by the contractor for approval by the Government.

27.-29. **RESERVED.**

CHAPTER 3. PROJECT DESCRIPTION

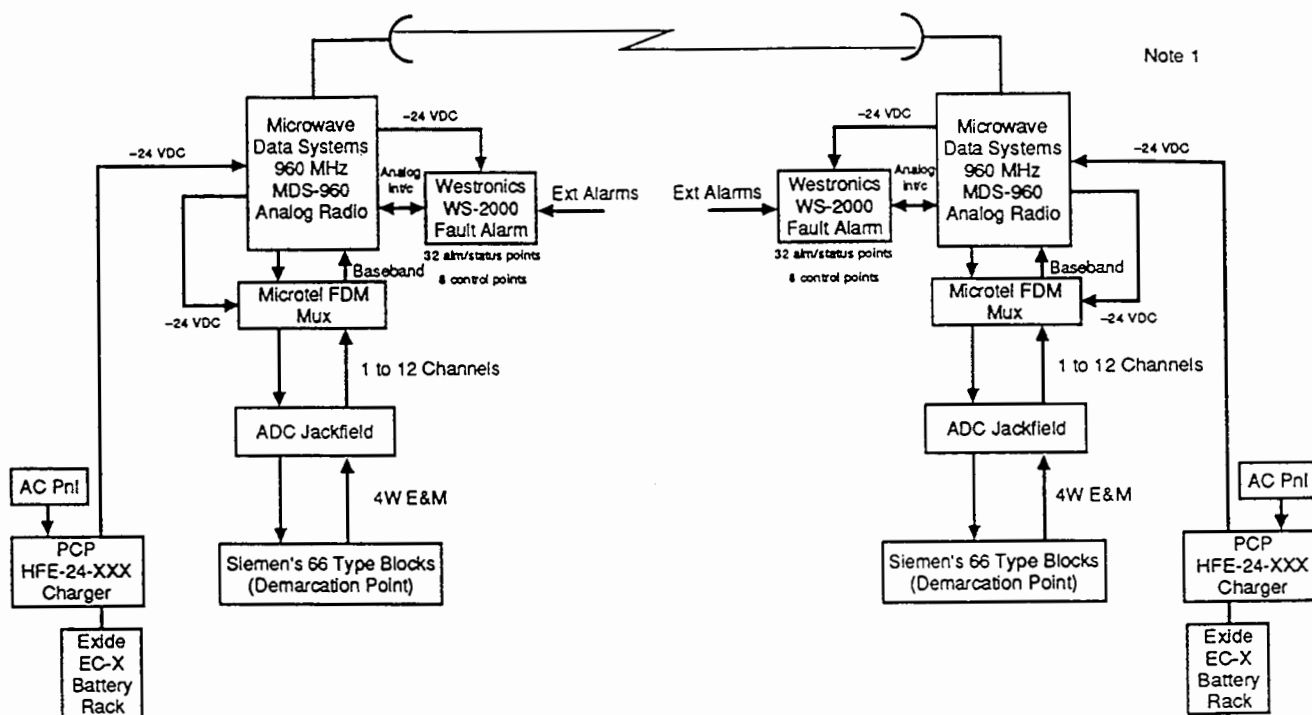
30. **FUNCTIONAL DESCRIPTION.** The LDRCL is a component of the RCL network or in some instances, a stand alone point-to-point short distance microwave communication system. The LDRCL is configured in four basic configurations: 900 MHz UHF; 1.8 GHz digital; 1.8 GHz analog; and 23 GHz digital. All configurations have the capability of being monitored for performance of the link through an automated remote monitoring system. This system will interface with the RCL automated network monitoring system which can be monitored at each ARTCC. A detailed functional description of the LDRCL is available in the latest version of the LDRCL specification, FAA-E-2853A.

a. **Common Features.** LDRCL systems common features are:

- (1) Full duplex operation.
- (2) Hot standby radio.
- (3) Automatic fault sensing and switching to standby channel.
- (4) No single point failure mode which could result in loss of the station and total loss of the route.
- (5) Independent single link party line for use as an order wire service channel.
- (6) Remote fault monitoring/sensing compatible with the RCL ANMS.
- (7) Mounting in standard 19 inch equipment racks no taller than 7 feet.
- (8) Batteries which do not require ventilation, battery racks, and battery chargers (either wall or rack mounted). Seismic battery racks will be provided where required.

b. **900 MHz UHF Links.** The UHF systems shall be capable of full duplex transmission of a single analog voice grade channel in the 932-935 MHz and 941-945 MHz Federal Government bands. The UHF systems are suitable for low density point-to-point applications with line of sight paths up to a maximum of approximately 60 miles. Figure 3-1 depicts a representative functional diagram. Additional features of the UHF systems are:

- (1) Minimum radiofrequency (RF) power output is 5 watts as measured at the transmitter's antenna output port.
- (2) Antenna beamwidth is restricted to 14° from 932-935 MHz and 20° from 941-945 MHz.

FIGURE 3-1. 900 MHZ ANALOG RADIO SYSTEM FUNCTIONAL DIAGRAM

Note 1. A 4W-600 ohm interface will be available to tie to ANMS for links that connect to RCL

(3) Optional expansion to a maximum of 12 voice channels by adding analog frequency division DTL multiplexers.

(4) Antenna options for 4-, 6-, 8-, and 10-foot grid type parabolic dish or corner reflector antennas.

(5) Unpressurized low loss coaxial transmission line.

c. 1.8 GHz Digital Microwave Links. The 1.8 GHz Digital Microwave systems will operate up to eight DS-1 channels in the 1.7-1.85 GHz and 2.0-2.29 GHz Federal Government bands. The 1.8 GHz digital link is suitable for applications with line of sight paths up to approximately 35 miles. Figure 3-3 depicts a representative functional diagram. Additional features of the 1.8 GHz digital systems are:

(1) Minimum RF power output 0.5 watts as measured at the transmitters antenna output port. One and 3 watt output options are available.

(2) Option for automatic transmitter power output control.

(3) Digital multiplexing capability with a maximum capacity of eight DS-1 channels.

(4) Fully redundant digital multiplexing at the channel bank level.

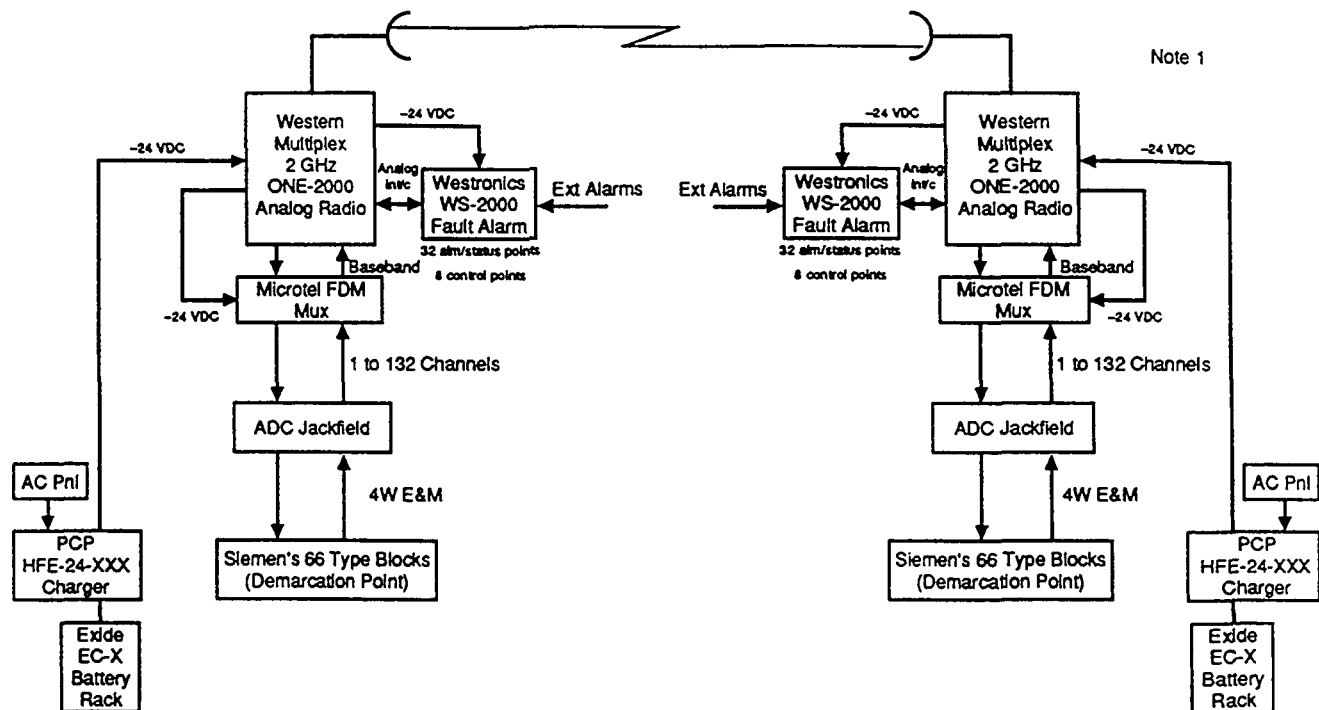
(5) Optional narrowband (no greater than 1.6 MHz) digital multiplexing configuration with the capacity for a single DS-1 channel.

(6) Antenna options for 6-, 8-, and 10-foot open grid parabolic dishes, solid dishes and other high performance configurations.

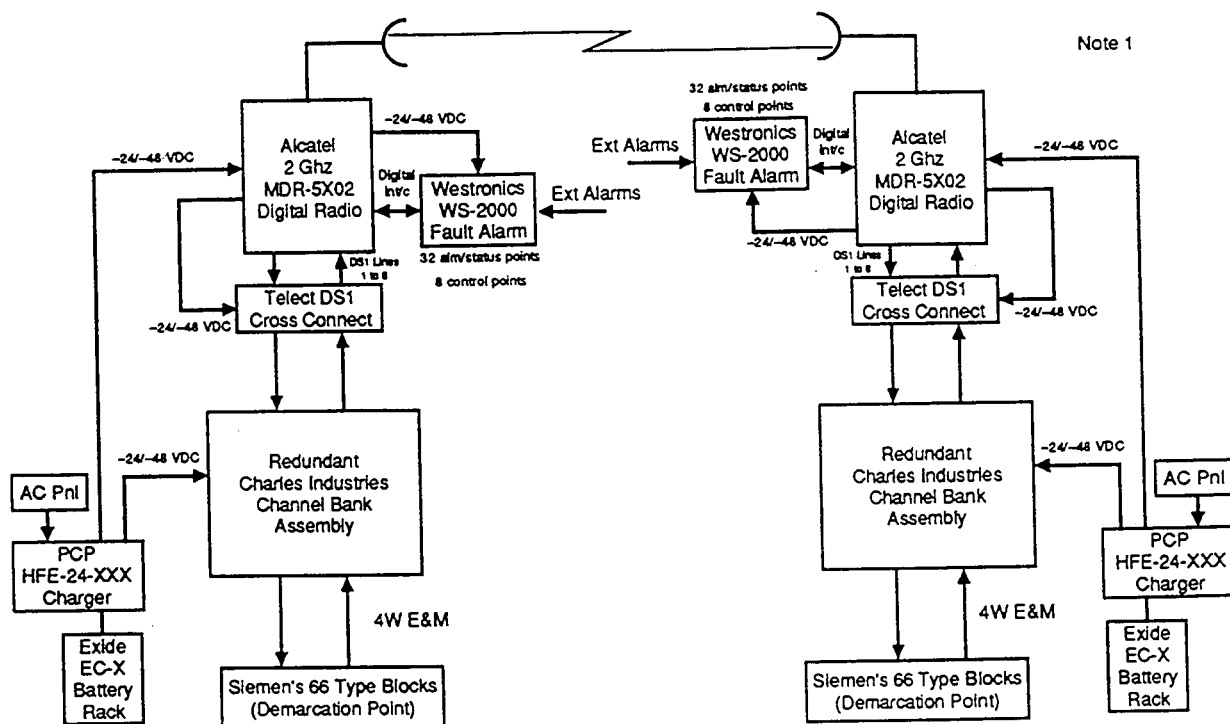
(7) Ice shedding radomes where required.

(8) Low-loss non-pressurized coaxial cable transmission line for runs up to 200 feet; pressurized cable is available for longer transmission lines.

d. 1.8 GHz Analog Microwave Links. The 1.8 GHz Analog Microwave system will operate in the 1.7-1.85 GHz and 2.0-2.29 GHz Federal Government bands. This system is suitable for applications with line of sight paths up to approximately 35 miles and is capable of handling up to 132 analog channels. Figure 3-2 depicts a representative functional diagram. The 1.8 GHz analog system was installed and tested at one location; however, the FAA has halted all deployment activities for the 1.8 GHz analog systems.

FIGURE 3-2. 1.8 GHZ ANALOG RADIO SYSTEM FUNCTIONAL DIAGRAM

Note 1. A 4W-600 ohm interface will be available to tie to ANMS for links that connect to RCL

FIGURE 3-3. 1.8 GHZ DIGITAL RADIO SYSTEM FUNCTIONAL DIAGRAM

Note 1. A 4W-600 ohm interface will be available to tie to ANMS for links that connect to RCL

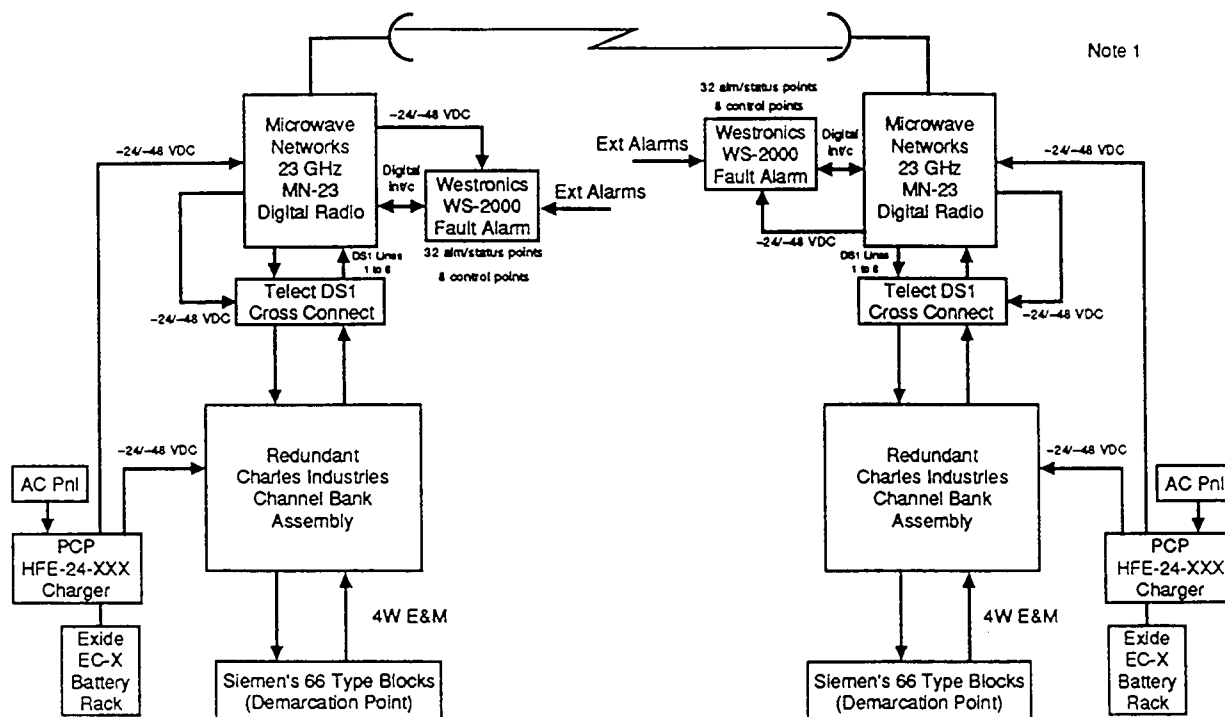
Additional features of the 1.8 GHz Analog Microwave Systems are:

- (1) Minimum RF power output 1.0 watt as measured at the transmitters antenna output port.
- (2) Options for high power transmitters (5 watt output) for the analog.
- (3) Analog data terminal equipment multiplexing capability with a maximum capacity of 132 voice channels.
- (4) Antenna options for 6-, 8-, and 10-foot open grid parabolic dishes, solid dishes and other high performance configurations.
- (5) Ice shedding radomes where required.
- (6) Low-loss non-pressurized coaxial cable transmission line for runs up to 200 feet; pressurized cable is available for longer transmission lines.

e. **23 GHz Microwave Links.** The 23 GHz equipment operates in the 21.3-23.6 GHz Government service band and uses pulse code modulation techniques. This equipment will be utilized for short range applications not to exceed 10 miles. Figure 3-4 depicts a representative functional diagram. Additional features of the 23 GHz link are:

- (1) Digital multiplexing capability with a maximum capacity of up to eight DS-1 channels.
- (2) Self-contained weatherproof housing for RF equipment.
- (3) Options for 18-, 24-, 27-. and 48-inch antennas.
- (4) Option for passive repeaters with back-to-back antennas.
- (5) Capability to remote the interface/modem unit 600 feet from the RF equipment.
- (6) Fully redundant digital multiplexing at the channel bank level with hot standby modems.

31. **PHYSICAL DESCRIPTION.** Representative physical features of the four major systems associated with the LDRCL project are given in table 3-1. All equipments are mounted in 19- or 23-inch racks and are configured for full standby operation. Unless specified, all system dimensions are for single unit configuration.

FIGURE 3-4. 23 GHZ DIGITAL RADIO SYSTEM FUNCTIONAL DIAGRAM

Note 1. A 4W-600 ohm interface will be available to tie to ANMS for links that connect to RCL

TABLE 3-1. DIMENSIONS AND WEIGHT

| Equipment Description | Dimensions |
|--|---|
| ALCATEL 5202 1.8 GHz DIGITAL MICROWAVE RADIO SYSTEM | 40.25"h x 19"w x 13"d WEIGHT 85 LBS |
| MICRONET 23, FOUR DSI/EIGHT DSI, INTERFACE UNIT, 23 GHz DIGITAL RADIO UNIT | 5.25"h x 19"w x 12"d WEIGHT 20 LBS (8 DSI PROTECTED) 12.3"h x 14.8"w x 6.8"d WEIGHT 27 LBS (HOT STDBY PROTECTED) |
| PRISM SINGLE CHANNEL MUX (12 CHANNEL SHELF) | 3.5"h X 19"w x 10.25"d WEIGHT 13.5 LBS |
| MICROWAVE DATA SYSTEM S, MDS-960 UHF RADIO | 15.85"h x 19"w x 8.75"d |
| CHARLES INDUSTRIES, WESCOM 360 D4 CHANNEL BANK (24 CHANNEL UNITS) | 24.5"h x 19"w x 12"d WEIGHT APPROX. 83 LBS |
| PCP BATTERY CHARGER | 21"h x 19"w x 14"d WEIGHT, 150 LBS |
| WESTERN MULTIPLEX ONE-2000 1.8 GHz ANALOG RADIO SYSTEM | 7"h x 19"w x 10"d WEIGHT APPROX. 15 LBS |

All LDRCL systems will possess some common features. See Appendix 4 for equipment figures.

32. **SYSTEM REQUIREMENTS.** The following requirements apply to the LDRCL equipment.

- a. **Duty Cycle.** Continuous operation (100 percent)
- b. **Ambient Operating Temperature.** 0° C to +50° C.
- c. **Relative Operating Humidity.** Up to and including 95 percent at +40° C.
- d. **Input Power.** All analog equipment shall operate at -24 VDC with a maximum of 300 mv of ripple. All digital equipment shall operate at -48 VDC (-44 to -56 VDC) with a maximum of 300 mv of ripple. The battery charger shall operate at 110/220 volts, +/- 20 percent, 60 hertz AC.

- e. **Equipment Racks.** All equipment, with the exception of the battery charger shall be mounted in standard 19- or 23-inch equipment racks no taller than 7 feet. The battery charger may be either wall mounted or rack mounted. Batteries shall be mounted either in standard battery racks or earthquake resistant seismic battery racks.
- f. **Service Life.** No less than 15 years of continuous operation.
- g. **Solid-State.** All active components, except relays, switches, and meters, shall be of solid-state construction.
- h. **Accessibility.** Each equipment module, assembly, and subassembly will be easily accessible and mounted to permit replacement without removal of other modules, assemblies, or subassemblies.
- i. **Cabling.** Rack cabling will be arranged so that equipment can be removed from the front of the rack without damaging the equipment or cabling.
- j. **Lighting Protection.** Grounding, bonding, and shielding will be in accordance with FAA-STD-019.
- k. **Transient Protection.** Grounding, bonding, and shielding will be in accordance with FAA-STD-020.
- l. **Equipment Finish.** In accordance with best commercial practices.
- m. **Equipment Cooling.** Ambient air.
- n. **Interchangeability.** Modules, assemblies, and subassemblies are interchangeable.
- o. **Mean Time Between Failure (MTBF).** MTBF of not less than 10,000 hours. The schedule for periodic maintenance is stated in the Maintenance Requirement Document.
- p. **Mean Time to Repair (MTTR).** A MTTR, as developed in the Maintenance Requirement Document, from a failure of no more than 30 minutes.
- q. **System Availability (A°).** A° of not less than 99.99 percent including the effects of path propagation conditions and equipment operation.
- r. **LDRCL Specification.** Refer to the LDRCL Specification, FAA-E-2853A, for further equipment requirements and parameters.
- s. **Mean Time Between Failure (MTBF).** MTBF for the LDRCL will not be less than 10,000 hours.

33. **INTERFACES.** The LDRCL project has a requirement for interfacing alarm and controls from the LDRCL systems into the existing RCL ANMS alarm system. The LDRCL project will incorporate the WS2000 alarm system which will interface to the RCL ACORN hub unit using TABS compliant protocol. These requirements are covered in detail in the contractor's technical proposal to the LDRCL contract and in the equipment manuals provided, by the contractor, with each system installation. Interface control documents will be developed by the contractor.

34.-39. **RESERVED.**

CHAPTER 4. PROJECT SCHEDULE

40. **PROJECT SCHEDULES AND GENERAL STATUS.** All LDRCL project schedules shall be approved by the Program Manager, ANC-400. The project schedule for the LDRCL equipment procurement, installation and support process has been established. The LDRCL project schedule is maintained on the Artemis scheduling system and is reviewed and updated regularly but not less frequently than quarterly. The LDRCL Program Manager receives regular briefings from the Associate Program Managers as to the status of their respective sections of the schedule. Case files will be generated and maintained to identify and track areas of potential concern. The LDRCL Program is currently fielding equipment at critical sites under a variance from the (DRR). The LDRCL Contract is a requirements contract. LDRCL requirements are currently in the process of being determined. A up-to-date deployment schedule will be added to this order as an appendix after LDRCL requirements and funding availability become more clearly defined. The LDRCL Project Implementation Schedule shall be approved by the Program Manager, ANC-400, and is contained in Attachment 3 to the LDRCL Project Implementation Book (PIB).

a. **LDRCL Project Implementation Schedule.** Phase I LDRCL Deployment Schedule is contained in Attachment 9A to the LDRCL PIB.

b. **LDRCL Project Implementation Schedule.** Phase II LDRCL Deployment Schedule is contained in Attachment 9A to the LDRCL PIB.

41. **MILESTONE SCHEDULE SUMMARY.** Figure 4-1 is a listing of the LDRCL project's major milestones with their associated scheduled completion dates. Updated schedules are available through the LDRCL Project Manager, ANC-800.

FIGURE 4-1. MAJOR MILESTONES

| MILESTONES | SCHEDULED DATE |
|-----------------------------|----------------|
| ILSP | JUNE 1993 |
| CONTRACT AWARD | APRIL 1991 |
| PROTEST HEARING | AUGUST 1991 |
| GAO REVIEW | OCTOBER 1991 |
| PROTEST DECISION | OCTOBER 1991 |
| MASTER TEST PLAN APPROVAL | DECEMBER 1991 |
| BEGIN TEST TEAMS TRAINING | JANUARY 1992 |
| NAILSMT | NOVEMBER 1992 |
| PROVISIONING CONFERENCE | OCTOBER 1993 |
| APPROVE OT&E/I TEST PLAN | JULY 1992 |
| APPROVE OT&E/S TEST PLAN | JUNE 1992 |
| PROJECT IMPLEMENTATION PLAN | JUNE 1993 |
| FIRST ORD, PHASE I | OCTOBER 1993 |

42. **INTERDEPENDENCIES AND SEQUENCE.** Installation of the LDRCL is not functionally dependent upon any other NAS project. Equipment will be scheduled for installation after system communication requirements have been reviewed and approved by the Telecommunication Management and Operations Division (TM&O), ASM-300. Upon receipt of approval, LDRCL site deployment will begin. Site deployment will follow the sequence outlined in the Appendix 2, LDRCL Site Deployment Cycle.

43.-49. **RESERVED.**

CHAPTER 5. PROJECT MANAGEMENT

50. **PROJECT MANAGEMENT, GENERAL.** The LDRCL project is a joint endeavor between ASM-300 and ANC-400. The project management organizations at FAA headquarters, and in the regions will be responsible for the successful implementation of the LDRCL equipments. ASM-300, is responsible for network planning and validating requirements for all applications that support the NICS. Once validated, these requirements will be transmitted by ASM-300 to ANC-400 for implementation. The LDRCL Program Manager, ANC-400, is responsible for implementation of the entire LDRCL project. The LDRCL Program Manager and Associate Program Managers are responsible for remaining informed on all the FAA policies and procedures, orders, directives, and instructions applicable to their areas of responsibility. They shall be responsible for carrying out their respective duties and assignments as defined in all pertinent FAA orders and instructions. A listing of documentation applicable to the LDRCL project is noted in paragraph 56. The LDRCL Program Manager and Associate Program Manager functions and responsibilities include, but are not limited to, the following:

a. **Program Manager for Interfacility Communications (ANC-400).** ANC-400 has responsibility for the management of the Interfacility Communications Program and will provide the following:

(1) Overall management and direction of all FAA activities necessary for successful development, acquisition, production, test and evaluation, implementation and transition to user organization, and engineering support of the LDRCL.

(2) Management of matrix organization support to LDRCL project.

(3) Defining the LDRCL project needs, including defining tasks to be performed and their expected results, staffing estimates, contract cost estimates, budget estimates, program schedules, management procedures and controls, and equipment and facility requirements.

(4) Establishing support agreements and holding FAA functional organizations accountable for integrated logistics support, systems engineering technical support, facilities planning, production quality and planning, test and integration, contracting and legal requirements for the LDRCL.

(5) Evaluate and document the effect of proposals to increase or decrease the resources authorized for LDRCL program execution and determine the effect of proposed changes on approved cost, schedules, procurement plans, and performance objectives.

(6) Serve as spokesperson for the LDRCL project inside and outside the FAA.

(7) Keep the Administrator informed, through appropriate FAA channels, of any situation when and if the LDRCL project requirements cannot be attained within available resources and time.

(8) Exercise fiscal responsibility for the LDRCL budget formulation and execution, including preparation of fiscal plans, budget estimates, program change requests, and reprogramming within authority granted by legal and administrative regulations.

(9) Assure the LDRCL project activity follows the performance, funding, and schedule requirements of the Interfacility Communications Program Master Plan.

b. **Associate Program Manager Functions and Duties.** Under the direction of the Program Manager, ANC-400, the following FAA Associate Program Managers will fulfill the indicated responsibility required for project implementation.

(1) **Interfacility Communications Division**, ANC-800, has been designated as the project manager for the LDRCL project. ANC-800 responsibilities for the LDRCL program are as follows:

(a) Serve as LDRCL Technical Officer (TO) or delegate the TO responsibilities to the LDRCL Project Manager.

(b) Develop and review the technical portions of the Telecommunications Service Requests (TSR), Statement of Work (SOW), specifications, Contract Data Requirements List, and PIP to ensure accuracy, quality, and technical integrity.

(c) Advise ANC-400 on contractual and technical areas of the LDRCL project.

(d) Any additional requirements identified for contractor performance.

(e) Monitor and track the LDRCL Contractor's performance.

(f) Review contract data deliverables and provide the evaluations to ANC-400.

(g) Review and analyze Engineering Change Proposals (ECP) and NAS Change Proposals (NCP). Provide review and analysis inputs to the Configuration Control Board (CCB) and ensure prompt implementation of all approved revisions and/or changes into the LDRCL Project.

(h) Ensure prompt closure of the DRR checklist and inputs for the DRR final report.

(i) Assist ANC-400 in the development and updating of budget estimates for LDRCL supportability requirements.

(j) Evaluate and compare the cost of the LDRCL project relative to the budget estimate throughout the planning and acquisition phase.

(2) **Associate Program Manager for Contracting-DECCO, (APMC-D).** The DOD Defense Commercial Communications Office (DECCO) has been designated as the APMC-D for the LDRCL contract. The APMC-D responsibilities include the following:

(a) Assure that all Federal procurement laws and regulations, implementing policy/procedure, and internal review/clearance requirements are followed and met in the course of the LDRCL activities.

(b) Assure that the organizational line managers are informed on the acquisition and associated activities in meeting the LDRCL Project mission.

(c) Convert LDRCL project requirements into contractual documents and provide technical management planning, contracts control, quality assurance, scheduling, and planning activity to assure that the terms of the contract are met.

(d) Manage the LDRCL solicitation process from solicitation of proposals through proposal evaluation, contract negotiation, and award.

(e) Issue all LDRCL contract modifications.

(f) Negotiate changes to any part or section of the contract.

(g) Perform as the contractor's single point of contact with respect to all contractual correspondence and other communication.

(h) Make all final decisions on contractor's claims.

(i) Attend periodic contract and program reviews.

(j) Authorize payments under the contract and any partial or withholding of payment under the contract.

(k) Exercise contract options.

(l) Appoint TO's and quality and reliability officers for the contract.

(3) **Associate Program Manager for Logistics (APML).** The National Airspace Integrated Logistics Support (NAILS) Program Division (ANS-400) has been designated as the APML for the LDRCL contract. The APML, from ANS-420, develops the program ILSP, advises ANC-400 on all NAILS requirements applicable to the LDRCL Project, and ensures all NAILS requirements are identified, managed, acquired, and integrated into the LDRCL acquisition in a manner that provides for life-cycle support. Additionally, the APML is responsible for the following:

- (a) Schedule and chair the LDRCL NAILS Management Team (NAILSMT).
- (b) Update, as required, the LDRCL ILSP.
- (c) Assist ANC-400 in developing and updating the LDRCL budget estimates for supportability requirements.
- (d) Ensure the logistics milestones for development and deployment of the LDRCL program are met.
- (e) Evaluate the cost of the NAILS program relative to the budget estimate throughout the planning and acquisition phase of the LDRCL Program. The APML shall notify ANC-400 if logistics efforts exceed the budgeted ceiling figures.
- (f) Outline any additional NAILS requirements identified, after contract award, for contractor performance and coordinates with NAILSMT members to ensure accurate, precise descriptions of all NAILS elements requirements.
- (g) Monitor and track the contractor's performance of the NAILS elements' requirements and provide performance quality and status evaluations to ANC-400.
- (h) Brief ANC-400 on the supportability requirements of the LDRCL Project.
- (i) Utilize the NAILS element managers as technical experts in their respective areas.
- (j) Coordinate and monitor the LDRCL training program development, review, and approval.

(4) **Associate Program Manager for Testing (APMT).** Manager, Design/Transition/Communications Division, ACW-400, is assigned as the APMT, for the LDRCL Project. The APMT is responsible for overseeing testing activities under the purview of the program manager and for providing technical support throughout the LDRCL implementation effort. These efforts include integration, testing, and development of the FAA LDRCL Master Test Plan (MTP). Additionally, the APMT is responsible for the following:

- (a) Provide the LDRCL Test Director.
- (b) Advise ANC-400 on all areas of LDRCL testing.
- (c) Jointly, with ANC-400, develops the LDRCL MTP for the project.
- (d) Provide support to execute the MTP consistent with the acquisition and deployment schedules.
- (e) Observe the LDRCL Factory Acceptance Test (FAT) and make appropriate recommendations to ANC-400.
- (f) Review the Contractor Master Test Plan (CMTP) and make appropriate recommendations to ANC-400.
- (g) Provide support to expedite the DRR process.
- (h) Oversee the conduct of acceptance of LDRCL testbed equipment.
- (i) Support any additional field acceptance testing to consider a unique site, interface, operational, or environmental requirement.
- (j) Review all LDRCL field site acceptance test plans and monitor all field testing.
- (k) Provide follow-on testing support after first site Operational Readiness Demonstration (ORD) and project implementation to verify that long term LDRCL performance meets specifications.
- (l) Provide support, as required, for LDRCL warranty compliance.
- (m) Prepare memorandums of understanding (MOU) with submatrix elements, as required, for support of the LDRCL test effort.
- (n) Present LDRCL Test Program reviews that cover areas of accomplishments, commitments, future efforts, test program risks, concerns, and recommended solutions to ANC-400 and the Test Policy and Planning Review Committee (TPRC).

(o) Inform ANC-400 of any items identified which may affect LDRCL project costs, milestones, schedule delays, or technical feasibility.

(p) Develops test procedures and test reports.

(5) **Associate Program Manager for Systems Maintenance (APMSM)**. ASM-300 is designated as the APMSM. The APMSM provides telecommunications network planning and implementation advice and support to the Interfacility Communications Program Manager, ANC-400. The APMSM is responsible for the following:

(a) Plan and budget for phase II systems and requirements, and submit those requirements to ANC-400, for timely implementation.

(b) Network planning and validation of requirements for all LDRCL applications that support the NICS.

(c) Provide Telecommunications Management and Operations (TM&O) and maintenance requirements for the LDRCL.

(d) Review and approve the technical portions of the TSR's, SOW, specifications, and CDRL's.

(e) Provide the Network Operations Plan which includes the transition from the implementation phase to the operational phase.

(f) Advise ANC-400 on the telecommunications network planning, implementation, and maintenance areas relating to the LDRCL project.

(g) Provide ANC-400 with specific requirements for the LDRCL project; including equipment type, quantity, location, and date equipment is required.

(h) Plan for all future "project driven" leased communications costs in LDRCL operation budgets.

(i) Assist ANC-400 in preparing the LDRCL F&E budget.

(j) Coordinate all LDRCL regional and/or field support.

(k) Attend LDRCL meetings and conferences.

(l) Support the LDRCL DRR process.

(m) Review, monitor, and assist ANC-400 in resolving LDRCL System Maintenance Service issues.

(n) Support follow on performance evaluations to ensure the LDRCL life cycle reliability and maintainability meets NAS requirements.

(o) Arrange for representation from ASM-300 for technical evaluation teams.

(6) **Associate Program Manager for Legal (APMGC).** The Procurement Legal Division, AGC-500, Contracts and Litigation Branch, AGC-510, is designated as the APMGC. The APMGC provides legal services and inputs to contractual documents and, when necessary, represents the program on legal issues with contractors, commissions and tribunals.

(7) **Associate Program Manager for Air Traffic Procedures (APMP).** The Procedures Division, ATP-100, En Route Procedures Branch, ATP-130, is designated as the APMP. The APMP is the focal point for advising ANC-400 on all air traffic related procedures and regulations affected by the program, when necessary, develop new or revise existing procedures, policies, or regulations to bring the LDRCL to an operational state and participate/observe field testing of the LDRCL.

(8) **Associate Program Manager for Air Traffic Requirements (APMR).** The Systems Plans and Programs Division, ATR-100, En Route Branch, ATR-110, is designated as the APMR. The APMR, in supporting the LDRCL Project, advises ANC-400 on air traffic control requirements, provides an input to the program acquisition strategy, supports Operational Test and Evaluation (OT&E) testing by ensuring the project meets Air Traffic requirements, observes field testing to ensure the project is operationally acceptable and meets air traffic requirements, acts as the spokesperson for Air Traffic, and provides coordination with Air Traffic field elements.

(9) **Associate Program Manager for Quality (APMQ).** The Industrial Division, ASU-400, Quality Assurance Branch, ASU-420, is designated as the APMQ. The APMQ provides advise to ANC-400 on LDRCL quality assurance matters. On site quality and reliability support at the contractor's and subcontractors' facilities. The APMQ specialists will be assigned to the manufacturing facility to provide advice to ANC-400 on LDRCL quality assurance matters.

(10) **Associate Program Manager for System Engineering (APMSE).** The NAS System Engineering Service, ASE-200, is designated as the APMSE. The APMSE will address system issues associated with requirements and program interfaces with the NAS. The APMSE shall serve as the focal point for:

(a) Refining and updating the NAS LDRCL requirements which serve as a basis for the next key decision milestone (KDM).

(b) Analyzing new requirements that have been identified since the LDRCL project was identified (KDM-1).

(c) Clarifying and interpreting the NAS baseline requirements for the LDRCL project.

(d) Providing information on LDRCL configuration management requirements, practices, procedures, and policies.

(e) Refining and updating the LDRCL mission requirements analysis that serves as a basis for KDM's 2,3, and 4, as required.

(f) Assigning LDRCL cost and benefit analysis by AOR, and facility system engineering support by AFE.

(g) Reviewing LDRCL specifications, SOW, MTP, NAS NCP's and ECP's, and other NAS subsystem requirements for conformance with policies, standards, and baseline specifications.

(h) Coordinating and providing technical support from functional divisions to resolve any LDRCL project issues.

(i) Resolving system issues that arise in connection with the development and implementation of the LDRCL project.

c. LDRCL Project Manager. The LDRCL Project Manager is responsible, to both ANC-400 and ANC-800, for the system development and equipment engineering from the design phase through the implementation phase. Additionally, the project manager is responsible for managing the procurement and implementation of all LDRCL equipment purchased, and/or leased by the project. Other program management activities include:

(1) Perform as Contracting Officers Technical Representative (COTR) within the limits permitted by the Federal Information Resources Management Regulations and Federal Acquisition Regulations. The COTR will provide technical guidance and direction to the contractor which do not effect cost schedule or technical performance.

(2) Develop, review, and coordinate technical documentation required in the acquisition, development, and implementation of the LDRCL project.

(3) Advise the Associate Program Manager for Engineering (APME) and the program manager on contractual, engineering, and technical areas of the LDRCL project.

(4) Review and analyze all LDRCL ECP's and NCP's and provide inputs to the APME and the program manager for forwarding to the CCB.

(5) Ensure prompt implementation of all LDRCL project revisions.

(6) Review and monitor the resolution of all LDRCL project related issues.

(7) Oversee the LDRCL item management function and maintain and coordinate revisions to the LDRCL data base.

(8) Schedule, chair, and/or participate in LDRCL related meetings and conferences.

(9) Report, weekly, all LDRCL project significant activities to ANC-400.

(10) Initiate LDRCL project related correspondence within the limits of the DFAR/FIRMR/FAR and all other correspondence in accordance with the FAA administrative guidelines.

(11) Evaluate and elevate, when necessary, LDRCL project problems to the project manager and ANC-400.

(12) Assist the project manager and ANC-400 in the development of budget estimates to ensure LDRCL project supportability based on engineering consideration and technical requirements.

(13) Evaluate, throughout the planning and acquisition phases, the cost of the LDRCL project relative to the budget estimates. Keep both the project manager and ANC-400 apprised of the cost relationship of the actual and budgeted engineering efforts and notify both when the budgeted ceiling figures may be exceeded.

(14) Within the scope of the contract, provide technical guidance and direction to the LDRCL Contractor and ensure that he/she has access to technical documentation, appropriate data bases, and sources of information relative to Government Furnished Equipment (GFE).

(15) Develop and maintain the LDRCL Systems Integration Plan, including detailed deployment schedules.

(16) Ensure LDRCL adherence to the CIP requirements.

(17) Develop and maintain an LDRCL implementation milestone schedule.

(18) Develop and maintain the LDRCL PIP.

(19) Develop and maintain the LDRCL PIB.

(20) Coordinate in the development of the LDRCL MTP by the APMT.

(21) Serve as a member of the LDRCL Deployment Readiness Review (DRR) team.

(22) Support the FAA Technical Center, ACN-200, in LDRCL integration testing as required.

(23) Support the Navigational Aids/Communication Engineering Branch, ASM-600, project engineer in LDRCL shakedown testing.

(24) Review LDRCL system engineering requirements and analyses.

(25) Coordinate each LDRCL site acceptance test, monitored by the regions.

(26) Coordinate completion of the LDRCL Contractor Acceptance Inspections (CAI).

(27) Through the Regional Associate Program Managers, coordinate completion of the LDRCL final JAI.

(28) Responsibility for all inspection and acceptance activities for each LDRCL system.

d. **Contractor Project Management.** The contractor will develop a plan to document contractor support of the project. This Contract Management Plan will contain the contractor's organizational structure as it relates to the contract including the identification of key personnel and their resumes, resource plans for completing contract tasks, and schedule plans.

51. **PROJECT CONTACTS.** A listing of all project management personnel designated as contacts for their respective organizations for the LDRCL Project are available in the PIB. Copies of the PIB may be obtained by contacting the LDRCL Project Manager, ANC-800, at 202-287-7172. All official LDRCL correspondence should be routed through the LDRCL project office. The LDRCL project office's mailing address is:

Interfacility Communications Program, ANC-400
Federal Aviation Administration National Headquarters
800 Independence Avenue, SW
Washington, D.C. 20591

Appendix 3 contains a listing of key FAA LDRCL organizations by functional area of responsibility.

52. **PROJECT COORDINATION.** The following organizations and people are responsible for coordinating their respective areas of responsibility within the LDRCL Project:

a. **FAA Headquarters Support Responsibilities.** Under the direction of the program manager, ANC-400, the following organizations within FAA headquarters, Washington, D.C., will fulfill the indicated responsibility required for project implementation.

(1) **Systems Maintenance Service (ASM).**

(a) **Maintenance Engineering Division (ASM-100).** The Maintenance Engineering Division Manager is responsible for planning/monitoring the execution of FAA maintenance policy, ensuring that

required maintenance and equipment documentation and resources have been identified and action has been taken to procure support.

(b) **Technical Training and Certification Branch (ASM-250).** The Technical Training and Certification Branch Manager is responsible for developing maintenance planning factors to be used in determining staffing levels to support the project. Validates and approves the training requirements to support fielded systems.

(c) **Spectrum Engineering Division (ASM-500).** The Spectrum Engineering Division Manager provides for the frequency assignment and antenna polarizations for all systems to be installed. ASM-500 is also responsible for spectrum management ensuring compliance with established directives.

(d) **NAS Support Division (ASM-700).** The Manager, NAS Support Division (ASM-700), develops policy and provides guidance for inventory management, provisioning, supply support, transportation, storage and disposal of personal property. ASM-700 is also responsible for providing overall policy and procedural guidance for the acquisition, management, and disposal of real property.

(2) **Office of Training and Higher Education, Airway Facilities Training Program Division (AHT-400).** The manager of the Airway Facilities Training Program is responsible for establishing training policy and analyzing the training proposals prepared by the contractor and ASM-250. AHT-400 is also responsible for initiating all actions to meet each of the LDRCL training requirements.

(3) **Engineering Specialties and Configuration Management Division (ASE-600).** The Engineering Specialties and Configuration Management Division Manager is responsible for establishing, coordinating, updating, and managing the system configuration and review all contractor products related to configuration and configuration control.

(4) **National Airway Systems Engineering Division (AOS-200).** AOS-200 is responsible for developing system certification criteria and performing second-level site engineering support for LDRCL equipment restoration for LDRCL equipment, software, and firmware configuration management after Government acceptance of the equipment/system. The Manager of the Navigation/Communication Engineering Branch, AOS-240, of the National Engineering Field Support Division, is responsible for development of system shakedown test procedures and performance of the system shakedown test.

b. **Mike Monroney Aeronautical Center Support Responsibilities.** The FAA Logistics Center and FAA Academy will support the LDRCL implementation as follows:

(1) **FAA Logistics Center (AML-1).** The Director, FAA Logistics Center, shall participate in the development of all LDRCL logistics and plans, coordinate all LDRCL provisioning conferences,

review and approve all contractor data pertaining to LDRCL provisioning and supply support, and manage and coordinate all depot level maintenance performed by the contractor. Management of all LDRCL provisioning shall be assumed by AML-1 no later than the beginning of fiscal year 1995 (October 1994).

(2) **Engineering and Production Division (AML-440).** The Manager, Engineering and Production Division, is responsible for coordination of all LDRCL depot-level engineering and the management of all LDRCL depot level maintenance performed at both the FAA Logistics Center and the contractor's facility.

(3) **FAA Academy (AMA-1).** The Superintendent of the FAA Academy is responsible for technical evaluation of contractor training and for development and conduct of FAA training (when required). The FAA Academy is scheduled to assume all LDRCL maintenance and operator training no later than August 1993.

c. FAA Field Activities Support Responsibilities.

(1) **Regional Project Management.** The regional Airway Facilities divisions, have each assigned an Associate Program Manager to coordinate project LDRCL implementation activities within their region. Additionally, all LDRCL requirements generated by the regions will be coordinated through their Associate Program Managers for transmittal to headquarters for implementation.

NOTE: Coordination with regional real estate branch offices (AXX-56's) is required to determine that all property rights have been acquired prior to any installation. Any new or expanded land site requirements shall be coordinated with AXX-56's for property rights and the regional Program Manager for Environment and Safety to determine regional Hazardous Material (HAZMAT) testing procedures.

(2) **Regional Implementation Responsibilities.** The Regional Associate Program Managers will manage LDRCL project implementation in accordance with the following procedures:

(a) Coordinate with the regional Airway Facilities divisions and facility managers in matters pertaining to the LDRCL, and be the focal point for site configuration management, site preparation support, site survey support, equipment installation support, site acceptance testing support, documentation of regional network(s), local path engineering, site spectrum compatibility, and property disposal.

(b) Interface with the Airway Facilities Sector Managers on all LDRCL equipment implementation activities including hardware delivery, installation, integration and testing, system shakedown, operational readiness demonstration, equipment relocation, JAI, and property disposal.

(c) Coordinate assignment of a Technical Onsite Representative (TOR) for each system. Provide implementation direction to the TOR.

(d) Interface with regional TM&O branch managers to validate regional requirements and ensure conformance to regional and national telecommunications network plans and policies, confirm LDRCL utilization plans with respect to existing and planned telecommunications requirements, and validate cost effectiveness of LDRCL implementation techniques with respect to leased services cost containment goals.

(e) Coordinate with the LDRCL Project Manager on phase I and phase II implementation activities which include implementation planning, project funding, scheduling, site preparation, installation, testing, training, maintenance, and integrated logistics support.

(f) Coordinate real property acquisition requirements with regional real estate branch offices.

(3) **Facility Project Management.** The regional TOR is responsible for the contractual management of all regional LDRCL installation(s). The TOR will be the region's representative to ensure that the LDRCL contractor performs in accordance with the terms of the contract and will be responsible for all FAA coordination with the contractor at the site. Organizationally, the TOR will work with the regional Associate Program Manager. The TOR will attend LDRCL contractor training courses to the extent possible, and be required to:

(a) Assist the LDRCL Contractor in conducting all site surveys and installations. The TOR, or his/her F&E representative, shall participate in all contractor site surveys and installations.

(b) Ensure that site preparation activities are complete and acceptable prior to LDRCL equipment delivery.

(c) Coordinate with the site manager the scheduling of site personnel necessary to support or monitor the installation of LDRCL equipment and ensure site concurrence with any installation work to be performed after normal working hours.

(d) Ensure that installation, integration, and acceptance testing have been completed satisfactorily. Sign off on the successful site installation.

(e) Provide the site manager with status and progress reports on the installation and check-out of the LDRCL system.

(f) Coordinate the JAI in accordance with Order 6030.45, Facility Reference Data File, and submit the JAI report.

(g) Sign and date DD 250 forms to verify receipt of contractor provided equipment or services.

(h) Review Path Analysis and Site Installation Plans.

(4) **Property Disposal.** Regional and local property managers must coordinate disposal of all LDRCL replaced equipment and associated spare parts in their immediate region with the FAA Logistics Center, Navigation Communication Engineering Unit, AML-445A to determine if the replaced equipment should be forwarded to the FAA Logistics Center to provide improved/expanded support for fielded equipments which have not been replaced with the new LDRCL equipment. If the replaced equipment is not needed by the FAA Logistics Center then the remaining equipment is disposed of in accordance with Order 4800.2B, Utilization and Disposal of Excess and Surplus Personal Property. Additionally, regional site technical personnel shall provide assistance to the regional property managers in identifying and handling equipment which contain hazardous materials and/or precious metals.

53. **PROJECT RESPONSIBILITY MATRIX.** The matrices presented in Appendix 3 show the primary and secondary responsibilities and/or functions of the LDRCL Associate Program Managers.

54. **PROJECT MANAGERIAL COMMUNICATIONS.** Project reviews will be scheduled and conducted by the LDRCL Project Manager, ANC-800. The following are prepared or conducted on a recurring basis as noted in support of the project: ANC-400 Newsletter, MSA briefings (semi annually), ANC-400 Program Manager Review (PMR) (quarterly), conference call with contractor (weekly), LDRCL Deployment Schedule (weekly), DRR program reviews. Additional technical interchange meetings will be convened with the appropriate organizational elements on an as-required basis.

55. **IMPLEMENTATION STAFFING.** There are no unique or peculiar staffing requirements associated with LDRCL project implementation.

56. **PLANNING AND REPORTS.** The following plans and reports will be required during the acquisition, testing and implementation phases of the LDRCL equipment.

a. **Contractor Documentation.** The contractor will submit the following CDRL items:

- (1) Configuration Management Plan.
- (2) Conference agenda.
- (3) Conference minutes.
- (4) Factory test procedures.
- (5) FAT Report.
- (6) Path Analysis, Installation and Integration Plan.

- (7) System Field Acceptance Test Plan.
- (8) System Field Acceptance Test Report.
- (9) Integrated Support Plan.
- (10) Repair level analysis reports.
- (11) Post Production Support Plan.
- (12) Training Development Plan.
- (13) Test plan.
- (14) Cumulative repair reports.
- (15) Contract Management Plan.
- (16) Repair and replacement parts availability data documentation.
- (17) Logistics Support Analysis Plan.
- (18) LSA 061, Parts Master File.
- (19) Long lead time items.
- (20) Design change notice.
- (21) Supplementary provisioning technical documentation.
- (22) Milestone chart.
- (23) Repair Status Report.
- (24) Monthly progress reports.

b. **Equipment Documentation.** The LDRCL equipment will be documented in the plans and reports listed in subparagraphs 56b(1) - 56b(6).

- (1) Project Master Test Plan.
- (2) NAILS Integrated Logistics Support Plan.
- (3) DRR Report.
- (4) Integration and Test Plan.
- (5) Shakedown Test Plan.
- (6) JAI Report.

57. **APPLICABLE DOCUMENTS.** The list of standards and orders that are applicable to the implementation of the LDRCL are provided in subparagraphs 57a - 57d and also in the LDRCL contract document DCA 200-91-D-0022.

a. **SPECIFICATIONS:**

| | |
|-------------|--|
| FAA-G-2100 | Electronic Equipment General Requirements |
| FAA-E-2853 | Specification - Low Density Radio Communications Link |
| FAA-G-1375 | Spare Parts-Peculiar for Electronic, Electrical and Mechanical Equipment |
| MIL-E-17555 | Electronic and Electrical Equipment Accessories and Repair Parts |

b. **STANDARDS:**

| | |
|-----------------|---|
| FAA-STD-13a | Quality Control Program Requirements |
| FAA-STD-019B | Lightning Protection, Grounding, Bonding and Shielding Requirements for Equipment |
| FAA-STD-020A | Transient Protection, Grounding, Bonding and Shielding Requirements for Equipment |
| FAA-STD-021A | Configuration Management |
| FAA-STD-024 | Preparation of Test and Evaluation Documentation |
| FAA-STD-028A | Contract Training Program |
| FAA-STD-034 | Instructions for the Preparation of Logistic Support Analysis (LSA) Data |
| FAA-STD-036 | Preparation of Program Implementation Plans |
| MIL-STD-129 | Marking for Shipment and Storage |
| MIL-STD-1189 | Standard Symbology for Marking Unit Packs, Outer Containers, and Selected Documents |
| MIL-STD-1388-1A | Logistic Support Analysis |
| MIL-STD-1388-2A | DOD Requirements for a Logistic Support Analysis Record (LSAR) |

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6540.8

MIL-STD-1561B Provisioning Procedures, Uniform DOD

c. **ORDERS**

- 1320.1D FAA Directives System
- 1800.8F National Airspace Configuration Management
- 1800.57 Establishment of the NAS Configuration Control Board (CCB)
- 1800.58 NAILS Policy
- 1800.63A NAS DRR Program
- 1810.1F Acquisition Policy
- 1810.4B FAA NAS Test and Evaluation Policy
- 3000.6B Training
- 4400.52 Procurement Planning Requirements
- 4441.3 Procedures for Leasing Commercial Communications Services
- 4441.9 Practices Concerning Leased Telecommunications Services
- 4560.1B Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Material
- 4650.22 Vendor Shipments of Nationally Furnished Project Materiel
- 4650.30 Management and Control of NAS F&E Projects Materiel
- 4650.7A Management of NAS F&E Project Materiel
- 4800.2B Utilization and Disposal of Excess and Surplus Personal Property
- 6000.30B Policy and Maintenance of the NAS Through the Year 2000
- 6030.45 Facility Reference Data File

d. **OTHER DOCUMENTS:**

ASTM-D-3951 Standard Practice for Commercial Packaging
29 CFR 1910 Occupational Safety and Health Administration
Standards

LDRCL Integrated Logistics Support Plan

LDRCL Statement Of Work

58. **TECHNICAL ASSISTANCE CONTRACTOR (TAC).** The Technical Assistance Contractor (TAC) under the direction of the program manager will maintain the LDRCL PIB, the Master Baseline Schedule, and the coordination and preparation for the DRR.

59. **RESERVED.**

CHAPTER 6. PROJECT FUNDING

60. **PROJECT FUNDING STATUS, GENERAL.** Overall funding for LDRCL Phase I implementation will be programmed and supplied by ANC-400. Phase II funding shall be supplied by ASM-300. Specifically, funds will be provided for the equipment purchase and/or lease, installation, training, and all technical/network engineering services available through the contractor. Funding for real property acquisition, disposal of decommissioned sites, HAZMAT testing, real estate personnel site visits must be requested in the budget process. Systems installed in support of special projects with separate funding will be funded by that project. There is no funding in the CIP for the LDRCL Project beyond the fiscal year 1995 although a mission needs statement for Phase II systems will identify replacement beyond that date. Current F&E funding requirements for the LDRCL are as follows:

a. **Phase I.** F&E funding for LDRCL Phase I requirements are listed under CIP Project 25-03.

b. **Phase II.** F&E funding for LDRCL Phase II requirements are listed under CIP Project 45-05.

61. **FUNDING REQUIREMENTS.** Funding responsibilities are delineated as follows:

a. **Telecommunications Management and Operations Division Manager, ASM-300.** ASM-300 provides and maintains a priority listing of Phase II LDRCL project sites which indicates the type and quantity of equipment to be ordered and installed.

b. **Interfacility Communications Program Manager, ANC-400.** ANC-400 will:

(1) Issue separate TSR's to the contracting officer, for equipment and services to be delivered and/or installed.

(2) Budget and provide F&E funding for contractor on-call maintenance and depot repair through September 30, 1994 (FY-93).

(3) Coordinate with the Technical Standards Program Manager, ASM-120, and the Director, FAA Logistics Center, AML-1, to ensure operations funding is budgeted and provided for on-call maintenance and depot repair commencing October 1, 1993 (FY-94).

c. **Technical Standards Branch Manager, ASM-120.** ASM-120 shall provide operations funding for contractor provided on-call maintenance costs commencing October 1, 1993 (FY-94), and for each renewable contract option year thereafter.

d. **Director, FAA Logistics Center, AML-1.** AML-1 will provide operations funding for contractor provided depot repair costs commencing October 1, 1994 (FY-95), and for each renewable contract option year thereafter. Fiscal Year 1995 is the first year the FAA Logistics Center will budget and obtain operations funds.

e. **Maintenance Operations Division Manager, ASM-200.** ASM-200 will provide technical personnel to participate in and/or conduct FAT and Phase I OT&E/I. The Technical Training and Certification Branch, ASM-250, shall provide funding, for travel and per diem, to and from the Alcatel training facility at Richardson, Texas, and the FAA Academy.

62.-69. **RESERVED.**

CHAPTER 7. DEPLOYMENT

70. **GENERAL DEPLOYMENT ASPECTS.** The LDRCL equipment deployment determination will be made by the Associate Administrator for Airway Facilities (AAF-1). The deployment decision will be based on the FAA's assessment of the extent to which the LDRCL equipment is ready to be successfully integrated into the NAS and the extent to which the FAA infrastructure is prepared to accept, operate, and support the deployed equipment throughout its life-cycle. This decision will be made as part of the DRR process as defined in Order 1800.63. The iterative DRR process will be used, one for each equipment configuration, in order to ensure the timely deployment of hardware to the field.

a. **DRR ISSUES AND CONCERNS.** DRR issues/concerns requiring action prior to deployment will be identified in the DRR reports. A detailed DRR checklist will be used to ensure that all significant areas of concern are identified during the review to include the following:

- (1) NAS system requirements.
- (2) Maintenance planning.
- (3) Project implementation.
- (4) Contract status.
- (5) Configuration management.
- (6) Facility/site preparedness.
- (7) Test program.
- (8) Software and firmware integration and maintenance.
- (9) NAILS.
- (10) Training.
- (11) Staffing.
- (12) Communications.
- (13) Man-machine interface.
- (14) Automated information systems security effectiveness.

b. **DRR SCHEDULE.** The LDRCL has a DRR schedule for each of the four major LDRCL configurations, they are:

| <u>DRR Action</u> | <u>Dates</u> | | | |
|----------------------------------|--------------|----------|----------|----------|
| | LDRCL 1 | LDRCL 2 | LDRCL 3 | LDRCL 4 |
| Initiate the DRR Process | 05/22/89 | 05/22/89 | 05/22/89 | 05/22/89 |
| Initial DRR Team Meeting | 08/01/91 | 08/01/91 | 08/01/91 | 08/01/91 |
| Draft Report Preparation Meeting | 12/23/92 | 04/08/93 | 07/26/92 | 11/12/93 |
| Shakedown Testing Complete | 07/29/93 | 09/30/93 | 10/28/93 | 01/08/93 |
| Deployment Determination | 10/30/93 | N/A | 01/04/94 | 08/09/93 |

71. **SITE PREPARATION.** LDRCL implementation planning must retain a degree of flexibility in the area of site requirements due to the wide variety of potential installation situations and the magnitude of required preparatory work (e.g., new installations versus replacement, different equipment/system types, state of existing facilities, RF environment.) For example, replacement systems will use existing power, towers and shelters whenever possible. However, tower height changes or facility modifications may be necessary to satisfy performance or equipment installation requirements. New communication systems may require the acquisition of real estate, a shelter, and tower. In support of this required flexibility, the LDRCL contract provides path analysis, site survey, site preparation, and site installation services. Implementation activities and requirements are presented in the following subparagraphs.

a. **Pre-Site Survey Requirements.** Prior to conducting a path analysis certain critical information must be compiled by the site managers and/or the regional LDRCL Associate Program Managers and forwarded to either the LDRCL Project Manager, ANC-800, or the LDRCL Contractor, Alcatel.

NOTE: Refer to subparagraph 25a if real property acquisition and/or leasing will be required in conjunction with a LDRCL site installation(s).

(1) **Site Data.** Information that must be made available during the site survey planning period and is required when ordering the site survey.

(a) **LDRCL Project Office.** The following information must reach the LDRCL project office prior to the planned site survey:

1. Coordinates of the sites in each system.
2. Height of all towers located at each LDRCL site.

3. Number of channels required of each system including the number and capacity of drop insert points (DIP) at each repeater sites with the DIP capability.

(b) **Contractor.** The following must be provided to the LDRCL Contractor prior to his/her arrival at the site for a site survey:

1. The address and directions to each site.
2. Name and phone number of the local FAA representative who will coordinate the site survey and accompany the contractor to each site during the site survey. This representative shall have the authority to approve equipment placement and site preparation planning at each site.
3. Potential union problems/restrictions.
4. Site access procedures and clearance requirements.

(c) **Arrival.** Provide the following information to the LDRCL Contractor upon his/her arrival at the site for site survey:

1. Floor plans of each site.
2. All available structural and tower data (i.e., site and tower drawings, tower analysis, location of buried cables).
3. A description of all planned site modifications.
4. Frequency authorization data for each site plus a listing of all expected EMI problems and sources.

b. **Site Survey.** As ordered by the Government, the contractor, in the presence of an F&E representative authorized to make decisions regarding site preparation, equipment installation, and equipment integration, will perform the site surveys. Site preparation and installation requirements will be discussed, and a recommended detail plan will be formulated for documentation by the contractor. The site survey will result in a comprehensive Path Analysis and Installation and Integration Plan for each system. The analysis shall be delivered to the LDRCL project office within 45 days after being ordered. Upon receipt of the plan, a review shall be conducted by sector personnel responsible for operation and maintenance of the system. Comments and recommendations shall be forwarded within 15 working days of receipt to the LDRCL Project Manager for review and incorporation into a formal response to the contractor. The Path Analysis, Installation, and Integration Plans developed by the contractor will contain, as a

minimum, the following information presented by drawings, charts, graphs, photographs, narrative:

- (1) Identification of the specific system for the site.
- (2) Site locations (coordinates and mailing address).
- (3) Elevation of the site(s).
- (4) Antenna locations.
- (5) Antennas (sizes and types) required.
- (6) Transmission line lengths and attenuation.
- (7) Transmitter output power recommendations.
- (8) Path loss calculations.
- (9) Identification of any significant external sources of EMI and recommendations for corrective action and associated cost estimate.
- (10) Description of site and environmental conditions.
- (11) Availability predictions based on expected environment and propagation conditions.
- (12) Schedule for the accomplishment of the installation activities.
- (13) Recommended facility site preparation modifications and estimated costs.
- (14) Equipment floor plan layout.
- (15) Description of how the equipment delivery will be accomplished.
- (16) Description of all installation requirements, characteristics, and efforts for each site.
- (17) Step-by-step description of how the system will be integrated into the facility and with other equipment at the facility.

NOTE: Refer to subparagraph 25a if real property acquisition and/or leasing will be required in conjunction with a LDRCL site installation(s).

c. **Frequency Assignments.** ASM-500 in coordination with the Regional Spectrum Management Office is responsible for assigning the operating frequencies for each of the LDRCL systems.

d. **Multiplex Options.** Both analog and digital multiplexing options are available for 1.8 GHz applications.

e. **Backbone RCL Bridging.** Circuit interface between LDRCL and RCL will be identified by the regional TM&O. The analog LDRCL and the RCL shall be provided via baseband bridging when 13 or more channels are to be connected to the RCL. The bridging equipment and associated cabling will be included in the LDRCL site procurement. The actual connection to the RCL system, however, shall be accomplished by the Government.

f. **Site Preparation Activities.** Site preparation, with the exception of permits and rights-of-way, will normally be accomplished by the contractor. All site permits, leases, easements, or other real property rights must be acquired by a properly trained and appointed FAA Real Estate Contracting Officer. Occasionally, site preparation may be accomplished all or in part by the regional Airway Facilities division. In these cases the contractor will not be scheduled to arrive at the site for installation until it has been verified that all site preparation work has been completed.

g. **Accessibility.** The contractor will require access to FAA sites in order to accomplish site surveys, site preparation, and site equipment installations. Access is required during normal working hours. Site access shall be coordinated at least 72 hours in advance through the regional LDRCL Associate Program Manager and/or TOR. An FAA regional F&E representative shall be onsite any/each time the contractor is working on a site.

h. **FAA Regional Support.** The FAA Regional Associate Program Managers are responsible for ensuring that the following site preparation actions are completed on schedule:

- (1) Provide a temporary replacement communication transmission system or gain service release authority from the users for the link which is designated for replacement. During the period which involves site preparation, removal of old equipment and installation of the replacement equipment, and through JAI and ORD a temporary communication path (land line) shall be provided by each region, as required.

- (2) Provide required guidance and assistance prior to site survey activities.

- (3) Establish an updated configuration baseline and drawing package for each site. This baseline shall satisfy floor space, equipment location, signal ground, and power requirements.

- (4) Prepare site plans and procedures necessary to receive and support the installation of the LDRCL equipment.

- (5) Support the contractor during site preparation and installation, e.g., coordinating with contractor prior to and during installation and integration activities, and escort the contractor to and from the installation site.

(6) Support contractor site preparation as identified in the Path Analysis, Integration, and Installation Plan, including site engineering and planning, updating facility documentation, drilling holes through floors and walls for cable routing and installing AC power and grounding required to support the new equipment.

72. **DELIVERY.** ANC-400 will order equipment for the proposed systems. Delivery of leased and/or purchased equipment shall be completed within 120 days after receipt of order by the contractor. The contractor shall furnish assembled and fully tested microwave systems consisting of terminal stations with straight through repeater stations with or without drop/insert capability. Each system shall include all equipment, equipment options, supplies, documentation, special equipment, and ancillary equipment of the types and quantities that meet or exceed the requirements of LDRCL equipment specification FAA-E-2853A. The Phase I LDRCL Deployment Schedule is contained in Attachment 9A to the LDRCL PIB. The Phase II LDRCL Deployment Schedule is contained in Attachment 9A to the LDRCL PIB. The contractor is responsible for all activities relating to packing and shipping of the LDRCL elements to field locations. Upon delivery of equipment to a site, the contractor shall prepare and furnish to the Government a Material Inspection Receiving Report, DD Form 250. For each system installation, the contractor shall certify on the submitted DD Form 250 that the segment of work (system) is completed and has been tested in accordance with the contract SOW. The regional TOR responsible for the site will process one DD Form 250 in lieu of the FAA Form 4500-1 for receipt of the equipment and a second DD Form 250 upon acceptance of the installation at that site. The LDRCL Program is currently fielding equipment at critical sites under a variance from the DRR. A finalized deployment schedule will be added to this order as an appendix after LDRCL requirements and funding availability become more clearly defined.

73. **INSTALLATION PLAN.**

a. **General.** After the contractor has performed the path analysis and site survey and developed an integration plan with input from the FAA representative assigned, a comprehensive installation plan shall be developed. This plan will be based on information obtained from a contractor site survey and an approved integration strategy, and it will contain all requirements necessary to support the installation. Additionally, the plan will discuss all installation requirements, characteristics or efforts which are unique to the site, the method of cut over to the new equipment and how the equipment will be installed with minimal impact upon existing facilities and system operation. This plan will be delivered as part of the Path Analysis, Installation, and Integration Plan.

b. **Installation.** When installation is ordered by the Government, the contractor shall:

(1) Submit a Path Analysis, Installation, and Integration Plan to the Government for approval not later than 45 days after the order is exercised. Upon receipt of the regional office, site, and project office comments from ANC-800, a functional plan shall be published.

(2) Accomplish those site preparation tasks identified in the plan ordered by the Government. Those tasks include, but are not limited to, delivery, unloading, inspecting, installation, configuring, integrating, and testing the LDRCL equipment.

(3) Be responsible for the installation and integration of all contractor supplied LDRCL equipment, and compatibility of all electrical, mechanical, and functional interfaces.

(4) Provide, install, and integrate cabling needed for all internal and external system interfaces (except for those cables which are GFE).

(5) Furnish all qualified labor, supervision, materials, equipment, and tools required to accomplish a turnkey installation.

(6) Complete system installation and checkout within 30 days after the equipment has been delivered onsite.

c. **Government Furnished Information.** The Regional Associate Program Managers shall supply the following to the LDRCL project office for all LDRCL systems.

(1) Altitude of the sites, measured above mean sea level.

(2) Height of towers.

(3) Latitude and longitude of each tower.

(4) FAA site identifications.

(5) Number and type of communication circuits required.

(6) Transmission Plan.

d. **Government Furnished Equipment.** The Government is responsible for furnishing the following items in support of the contractor installation:

(1) Shelter with a cleared space to install equipment racks and standby batteries; when required.

(2) An electrical power breaker at the Government power panel, and a demarcation panel for termination of all circuits.

(3) An appropriate grounding system.

(4) Tower or structure for mounting of the antennas, if available. New tower construction will be available under the LDRCL contract.

74.-79. **RESERVED.**

CHAPTER 8. VERIFICATION

80. **FACTORY VERIFICATION.** The LDRCL systems implemented under this project are COTS equipment. Alcatel, as directed by ANC-800, shall perform product testing in accordance with best commercial practice prior to shipment of the equipment to its designated test and/or field locations. These tests are considered pre-installation and integration tests, and are categorized as follows:

a. **Factory Acceptance Test (FAT).** FAT is an acceptance test performed by the contractor on each first article of equipment produced under this contract and witnessed by the FAA Technical Center, ACW-400. The purpose of FAT is to verify that the produced equipment complies with the LDRCL contract equipment specification, FAA-E-2853A, and is free from manufacturing defects. As part of FAT, the contractor shall conduct system end-to-end performance test on the first article of each system configuration.

b. **Production Acceptance Test and Evaluation (PAT&E).** The contractor will implement a Quality Control Plan which meets the intent of FAA-STD-013a. The contractor will be responsible for all performance testing for itself and its subcontractors. Standard equipment test forms used by the equipment manufacturers will be forwarded to the Government for review. Where required, test procedures will be revised to meet the intent of FAA-STD-013a. Government inspection of manufacturing facilities, including the test process, will be made available, as required.

c. **Site Acceptance Test.** The SAT is performed by the contractor at the field site and witnessed by FAA Technical Center and the project office. Much of it is a derivative of the Factory Test Procedures and is required to demonstrate that the LDRCL system operates in accordance with the LDRCL Specification and as an integrated system. The SAT also shall verify that the performance of the transmission link meets the calculated path analysis figures given in the Path Analysis, Installation, and Integration Plan documented for each site. Immediately following the SAT, a Functional and Physical Configuration Audit (FCA/PCA) is performed, for the first item of each system, to verify that all necessary data and equipment is on site.

81. **CHECKOUT.** Upon the successful completion of FAT or PAT&E, the LDRCL system will be shipped to a site for installation and follow-on testing. Onsite testing includes the SAT, CAI, OT&E (first article only), JAI, and ORD. Successful completion of CAI is one of the final steps in requesting a deployment decision.

82. **CONTRACTOR INTEGRATION TESTING.** Upon completion of equipment installation and checkout the contractor shall perform the system integration tests, for the first item of each system, as specified in the LDRCL Specification, FAA-E-2853, and in accordance with the CMTF Verification Requirements Traceability Matrix (VRTM) (under the Field Tests subheading). All subsequent systems will be tested in accordance with the SAT Plan.

83. **CONTRACTOR ACCEPTANCE INSPECTION.** After installation of each microwave system, and prior to the CAI, a SAT will be conducted by the contractor. This test is used to verify that the LDRCL equipment operates within contract specification requirements and that the equipment is ready for acceptance.

84. **FAA INTEGRATION TESTING.** The OT&E is prepared and conducted by the FAA to evaluate the subsystem operational effectiveness and suitability including compatibility, operability, survivability, maintainability, and supportability. The OT&E also identifies deficiencies in NAS hardware, software, human performance factors, and operational concepts. OT&E testing is divided into three subcategories: integration (OT&E/I), Operational (OT&E/O), and shakedown (OT&E/S). Leadership responsibility for the integration and shakedown testing resides in ACW-400 and AOS-200 respectively.

85. **SHAKEDOWN AND CHANGEOVER.** The following testing will ensure a proper shakedown and changeover of the LDRCL equipment:

a. **Operational Test and Evaluation/Integration (OT&E/I).** After the contractor has installed the first article and the system is accepted, OT&E/I testing will begin. The tests will be developed by ACW-400 and approved by the LDRCL Program Manager. These tests will involve a system concept approach in testing vendor-supplied hardware against selected NAS system specification functional requirements, and against allocated system-level requirements. The APMT may utilize the results of the successful vendors Operational Capability Demonstration to meet OT&E/I testing requirements. The test director will review all contractor test plans, procedures, and test result reports.

b. **Operational Test and Evaluation/Shakedown (OT&E/S).** Upon successful completion of OT&E/I test, OT&E/S testing will commence. This test is prepared by AOS-200, and performed on the initial installation of each equipment configuration. The purposes of the test are to verify the operational effectiveness and suitability of the LDRCL in the NAS. The test is coordinated with both the Air Traffic Requirements Service (ATR) and the Airway Facilities office. OT&E/S testing shall include, but is not limited to, the following:

(1) Testing of the installed equipment to verify that the integrated system meets specified functional and operational performance at each site.

(2) Verifying that required support items, such as support manuals, are available, technically compatible, and in compliance with the contract requirements.

(3) Verifying LDRCL equipment installation at the site by the participating TOR when checkout has been successfully completed and approved by the site manager. Site Installation and Checkout (I/CO) will be considered complete upon satisfactory completion of subparagraphs 84a - 84d.

(4) Verifying the adequacy of site training and personnel readiness.

(5) Processing and defining logistic support requirements.

(6) Verifying operational cutover procedures.

86. JOINT ACCEPTANCE INSPECTION (JAI). The JAI is the internal FAA process which the AF sectors will use to formally accept custody of the LDRCL equipment and assume responsibility for maintenance as provided under the contract. A JAI will be accomplished near the end of each site implementation and prior to becoming operational. The JAI is an inspection activity used to gain consensus among the involved FAA offices that the LDRCL equipment implementation has been completed in accordance with applicable specifications and standards, and that the equipment is capable of providing the services required within established standards and tolerances. Each JAI is accomplished in accordance with FAA Order 6030.45, Facility Reference Data File. A JAI will be performed for each system installation. JAI procedures and documentation will be prepared for each of the four basic system configurations.

87. OPERATIONAL READINESS DEMONSTRATION (ORD). The ORD is the date on which a new or improved facility or subsystem satisfies the FAA JAI construction, installation, performance, operation and maintenance criteria and is ready to be placed into operational use. Upon successful demonstration that the system has passed all testing and can be operationally supported, the system will be phased into the operational environment.

88. GENERAL. The LDRCL project will complete a test and evaluation process to verify that the system/subsystem requirements are met prior to operational acceptance. This process will be accomplished both at the contractor's factory and at each field location. The purpose of the test process is to ensure that the NAS requirements, such as operational effectiveness and suitability are verified prior to commissioning. The LDRCL Project MTP is the primary FAA testing vehicle while the CMTF is the primary contractor testing vehicle.

a. **Master Test Plan (MTP).** The Program Manager, ANC-400, and the LDRCL APMT, ACW-400, prepare the MTP. This plan, which was approved by the program manager on August 22, 1991, and the Test Plan Review Committee on December 13, 1991, defines the FAA test strategy, test requirement sources and test implementation responsibilities. It also presents an overview of mission need objectives for all test and evaluation phases of the program. Additionally, it relates the testing effort to technical risk, operational issues and concepts, system performance, reliability, maintainability and availability, and logistics requirements. Finally, the plan explains the relationship of subsystem tests and operational tests which, when analyzed together, provide confidence in the systems readiness for deployment.

b. **Contractor Master Test Plan.** The contractor's test plan provides information that pertains to testing that shall be accomplished by the contractor in the FAT's and SAT's. This test plan shall demonstrate traceability to the project specification VRTM, and it identifies the allocation of test requirements to subsequent test plans and procedures. It is contractually developed from the test requirements stated in the quality assurance section of the project specification and SOW.

89. **RESERVED.**

CHAPTER 9. INTEGRATED LOGISTIC SUPPORT

90. **MAINTENANCE CONCEPT.** The maintenance concept and the logistics support strategy for the LDRCL centers on the following items:

a. **Site Maintenance.** Site maintenance will be performed by the contractor during the equipment installation and checkout period. Upon site acceptance and commissioning by the Government, the FAA will assume the responsibility for all site level maintenance. Site maintenance will include all recommended preventative and required corrective equipment maintenance. Site level corrective maintenance will consist of fault isolation to, and removal of, the line replaceable unit (LRU). The removed, failed LRU will be replaced with an operable LRU from site spares stock, thus quickly restoring the LDRCL equipment to full service. The failed LRU will be packaged by the work center and shipped to the FAA Logistics Center. The FAA Logistics Center will ship the failed LRU to the contractor to effect depot level repair.

b. **FAA Engineering Support.** FAA second level engineering and maintenance support will consist of maintenance support not achievable by site level personnel. This level of maintenance will be provided by either AOS-200, or the contractor, at the direction of AOS-200. It will consist of technical assistance at the site or by telephonic assistance in the resolution of system malfunctions. The initiation of this level of maintenance will be the responsibility of Airway Facilities site maintenance personnel.

c. **Depot Maintenance.** Depot level maintenance will consist of repair on all modules, assemblies, subassemblies, circuit boards, and ancillary equipment identified as an LRU.

d. **Maintenance Staffing.** Staffing to support the implementation and life-cycle site maintenance support of the LDRCL will be identified in the MRD developed by ASM-240. Any increases in staffing requirements will be coordinated by ASM-260.

e. **Warranty Instructions.** The contractor will develop warranty instructions and these instructions will be provided as part of the ILSP.

91. **TRAINING.** The LDRCL training program, developed in accordance with FAA-STD-028A, shall be provided by the FAA Academy. The FAA Academy shall manage course attrition, refresher training, course upgrades, and technician proficiency training throughout the LDRCL life cycle. The current training strategy consists of four different microwave equipment training courses. Initially, a test technician training course was developed and 15 system evaluators/testers were trained to evaluate the system test results from FAT through OT&E to ORD.

The FAA Academy is scheduled to provide the full maintenance training responsibilities for the LDRCL system, beginning in the second quarter of fiscal year 1993. A description of the LDRCL training courses follows:

a. **FAA Test Technician Training Course.** This course, taught at the contractor's facility in January 1992, trained the FAA observers who will participate in the evaluation of the contractor's test plans and procedures for FAT, OT&E, and SAT of the initial four test systems. The course was designed to train those FAA personnel who will review and approve the test plans, procedures, and reports. Course subject matter included equipment installation techniques, equipment operation, equipment repair techniques, equipment tests and testing techniques, and identification and operation of all general and special purpose tools, handling equipment, and test equipment required to install and maintain the LDRCL microwave equipment.

b. **Commercial Training.** When requested by the Government, the contractor will provide Manufacturer Out-of-Agency Commercial Training by equipment type.

c. **FAA Academy Maintenance Training.** These courses shall be taught at the FAA Academy at the Mike Monroney Aeronautical Center, Oklahoma City, Oklahoma, to FAA field repair technicians who will be assigned repair/restoral responsibilities at LDRCL equipment sites. This training shall include equipment preventative and corrective maintenance techniques, equipment operation, equipment tests and testing techniques, and the identification and operation of all general and special purpose tools, handling equipment, and test equipment required to maintain the LDRCL microwave equipment.

d. **Training Assignments.** Training quota assignments for both contractor and FAA Academy training shall be the responsibility of ASM-250.

92. **SUPPORT TOOLS and TEST EQUIPMENT.** Only general purpose tools and test equipment are required to maintain the LDRCL equipments. Appendix 6 contains the list of test equipment required to support the LDRCL system in the field. This list was developed by ASM-120.

93. **SUPPLY SUPPORT.** The contract requires the contractor to provide a recommended quantity of onsite spare LRU's for each LDRCL site. Recommended site spares shall be determined by the Repair Level Analysis as screened by ASM-100. Recommended site spares will be determined in accordance with Order 6000.38, Policy to Determine NAS Equipment Initial Sparing Requirements for Airway Facilities Work Center Locations and Field Locations. ANS-400 will assist the program office with the sparing analysis and ASM-240 will validate the site sparing recommendation.

94. **VENDOR DATA and TECHNICAL MANUALS.** COTS instruction books and technical manuals have been provided by the contractor. A systems level manual will be developed by the contractor with support from AOS-200. Refer to requirements specified in LDRCL SOW of contract DCA 200-39-R-0061.

95. **EQUIPMENT REMOVAL.** As part of Phase I efforts, the FAA will remove existing link and ancillary equipment after completion of the RML link to LDRCL cutover. All equipment removed during Phase I will be disposed of in accordance with Order 4800.2B, Utilization and Disposal of Excess and Surplus Personal Property, and applicable regional procedures concerning disposition of excess property.

96. **FACILITIES.** LDRCL replacement systems will be configured to fit within existing facilities. Additional requirements to provide space for Phase II LDRCL systems are the responsibility of the Government. New requirements must be identified sufficiently in advance of equipment deployment schedules so as to have no adverse impact on those schedules. Additional site specific facilities requirements will be identified at each individual site survey.

97. **ADDITIONAL CONTRACTOR SUPPORT.** When requested by the FAA, the contractor will establish a toll-free telephone advisory service for FAA maintenance personnel. This service will provide technical specialists capable of providing guidance and assistance to FAA technicians in evaluating and resolving maintenance problems.

98. **SOFTWARE/FIRMWARE SUPPORT.** The contractor will provide all software and firmware support for the maintenance management and control systems.

99. **RESERVED.**

CHAPTER 10. ADDITIONAL PROJECT IMPLEMENTATION ASPECTS

100. **CONFIGURATION MANAGEMENT.** Configuration Management of the LDRCL shall be performed in accordance with FAA-STD-021a. The configuration management process is used to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, and record and report change processing and implementation status. The configuration management discipline will be applied to all configuration items included in the LDRCL baseline. All additions and changes to the LDRCL baseline will be proposed in the form of a case file and will be reviewed for approval or disapproval by a CCB.

a. **Acquisition Phase Configuration Management.**

(1) **FAA Responsibility.** The ANC-1 CCB controls the establishment of and changes to, the LDRCL hardware and software baseline(s) during the acquisition phase. The ANC-1 CCB is responsible for ensuring that the functional, performance, and interface requirements allocated to the LDRCL hardware and software subsystems are reflected in the baseline(s). The ANC CCB retains this configuration management responsibility until the last ORD has been completed.

(2) **Contractor Responsibility.** The contractor will plan, execute, and manage the configuration management functions associated with the development of the LDRCL hardware and software during contract performance, in accordance with FAA-STD-021a. This includes conducting all required configuration audits.

b. **Transition of Hardware/Software Configuration Management.** The configuration management responsibility associated with the LDRCL hardware and software products will transition from ANC-400 to ASM-600, after the last ORD has been completed. Approval authority of all LDRCL NCP activity will transition from the ANC-1 CCB to the Maintenance Engineering CCB.

c. **Operational Support Phase Configuration Management.** During the operational support phase of the life-cycle of implemented LDRCL hardware and software, configuration management functions will consist of maintenance and change control management. The participants and their roles are as follows:

(1) ASM-100 will chair the Maintenance Engineering CCB for all changes to the hardware and software and authorize all modifications.

(2) AOS-200 will be the recipient organization for engineering technical documentation for all hardware and software and will act as the custodian of hardware/software documentation and all software magnetic media.

AOS-200 is also responsible for reviewing all case files and any contractor generated ECP for proposed modifications to the LDRCL.

(3) AML-600 will be the recipient organization for all provisioning technical documentation for the LDRCL.

101. **SITE CONFIGURATION MANAGEMENT.** Regional CCB's are responsible for controlling changes to space management, critical power, site adaptation, equipment unique to region and regionally tailored construction specifications as stated in the regional CCB charters.

102.-109. **RESERVED.**

APPENDIX 1. DEFINITIONS

1. **Analog System:** A system capable of transmitting a continuous wave that is modulated (modified) in frequency or phase. The modulation is continuously variable, as opposed to a digital system which has only two states.
2. **Atmospheric Absorption:** Signal attenuation due to atmospheric absorption. For frequencies above 10 GHz, this becomes an important factor in link design.
3. **ARTEMIS.** A management tool used to facilitate project planning by generating automated activity sequencing charts using critical path methods.
NOTE: ARTEMIS is not an acronym.
4. **Backbone:** That part of the communication network which carries the heaviest traffic. It may be the more permanent part of a network.
5. **Baseband:** The foundation band of a transmission medium which defines the bandwidth of the information to be carried. Typically, the baseband is the input/output of the transmitter/receiver of a microwave link system.
6. **Bridge:** A device which interconnects two systems and allows circuits to pass from one to the other without demodulation.
7. **Channel Bank:** A multiplexer device that puts many slow speed voice or data conversations onto one high-speed link and controls the flow of those "conversations." Typically the device sits between a digital signal and a voice circuit.
8. **Channelized:** The division of a high speed data stream into individual circuits in an agreed upon standard manner. A channelized DS-1 (T-1) data stream consists of 24 DS-0 low speed channels, each of which can pass one voice channel or its equivalent.
9. **Digital Channel Bank:** A multiplexer device that accepts or delivers either analog or voice data or digital data and combines or separates this information into a digital stream for transmission over the transmission medium.
10. **Digital System:** A stream of on-off pulses is sent, as in computer circuits. Pulses are referred to as bits.

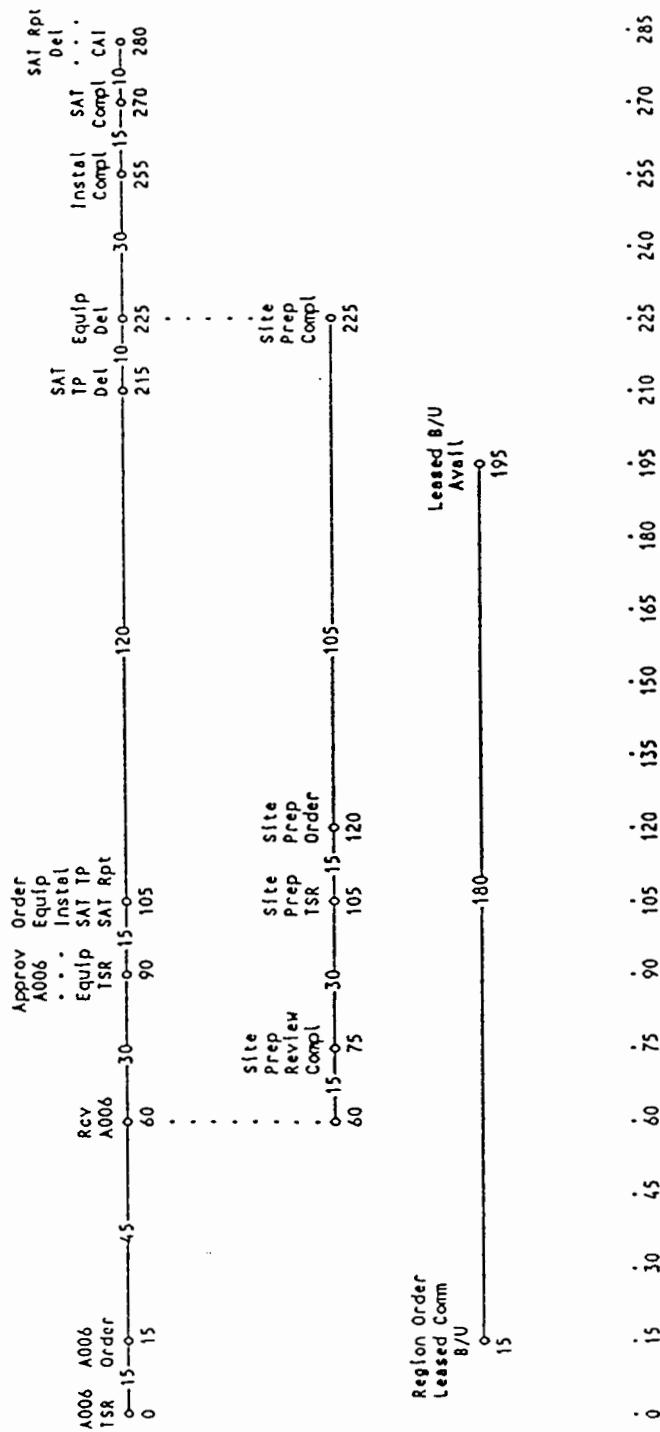
11. **Direct-to-Line (DTL) Multiplexer:** Analog multiplexing equipment that does not use sub-group, group, or supergroup multiplexors, as opposed to conventional frequency division multiplexing (FDM). DTL channel cards are connected directly to the baseband circuitry and generally may be tuned to any of 634 channels.
12. **Drop/Insert Point:** A gateway into the backbone RCL system providing channel access and two-way analog communications. A bridge circuit is required for requirements exceeding 12 VF circuits.
13. **DS-1 Circuit:** Digital Service, Level 1. The telephone industry primary standard digital signal used by the United States common carriers at 1.544 Mb/s.
14. **Fading:** Variation of received signal level with time due to changes in atmospheric conditions.
15. **Four-Wire Circuit:** A path in which four wires are presented to the terminal equipment (phone or digital) thus allowing for simultaneous transmission and reception.
16. **Frequency Diversity:** A technique to improve system reliability by transmitting the signal on two discrete radiofrequencies simultaneously. Reduced fading is realized since individual frequencies tend to fade under different atmospheric conditions. Two transmitters and two receivers are required at each site.
17. **Frequency Division Multiplexing:** A technique in which the available transmission bandwidth of a circuit is divided by frequency into narrower bands, each used for a separate voice or data transmission channel.
18. **Fresnel Zone Clearance:** Describes the area around the beam's center line where penetrating objects will cause wave reflections that will cancel out most or all of the beam's power at the receiver end.
19. **Hot-Standby:** Backup equipment kept turned on and operating in parallel with main equipment in case of failure within the main system.
20. **Line Replaceable Unit:** An item which may consist of a unit, an assembly, a subassembly, or a part that is removed and replaced at the site maintenance level to restore the LDRCL system to its operational status.
21. **Local Area Network:** A data communications network spanning a limited geographical area.

22. **Multiplexed Channel:** A communications channel capable of carrying the telecommunications transmissions of a number of devices, or users, at one time.
23. **Multiplexer:** Electronic equipment which allows two or more signals to pass over one line.
24. **Narrowband Operation:** Normally referred to channels that are 4 KHz wide. Will not pass raw radar video.
25. **Orderwire:** A circuit used by maintenance personnel for communications and control.
26. **Point-to-Point:** A communications capability directly between two points.
27. **Space Diversity:** A technique to improve system reliability by transmitting the signal over two physically separate radio paths simultaneously. Reduced fading is realized since individual paths tend to fade under different atmospheric conditions. Two antennas, usually separated vertically, are required at one, or more often, both sites. May be combined with frequency diversity for the greatest reliability.
28. **T-1 Circuit:** A digital transmission circuit with a capacity of 1.544 Mb/s. Similar to DS-1 circuit and is the standard for digital transmission in North America.
29. **User Access Network:** Allows an individual through a dedicated network of communications channels, the ability to obtain data and information from memory, a peripheral or another system.
30. **Wideband Operation:** A system carrying channels wider than the normal 4 KHz of most systems. Generally used for very high speed data or video. May pass raw radar and beacon data if the channel is wide enough.

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APPENDIX 2. LDRCL SITE DEPLOYMENT CYCLE



APPENDIX 3. ROLES AND RESPONSIBILITIES

Interfacility Communications Program

Program Manager and Associate Program Managers

1. PROGRAM MANAGER FOR INTERFACILITY COMMUNICATIONS, ANC-400, manages the Interfacility Communications Management Team matrix organization and sets program policy, schedules project reviews and contract negotiations and oversees funding.
2. ASSOCIATE PROGRAM MANAGER FOR CONTRACTING, ASU-330, selects, negotiates, awards and administers contracts for the program manager.
3. ASSOCIATE PROGRAM MANAGER FOR CONTRACTING, DECCO, selects, negotiates, awards and administers contracts for the program manager.
4. ASSOCIATE PROGRAM MANAGER FOR ENGINEERING, ANC-800, provides system development and equipment engineering from design phase through implementation. This office also provides the LDRCL project manager.
5. ASSOCIATE PROGRAM MANAGER FOR LEGAL, AGC-510, provides legal services, inputs to contractual documents and represents the program on legal issues with contractors, commissions and tribunals.
6. ASSOCIATE PROGRAM MANAGER FOR LOGISTICS, ANS-420, develops the Integrated Logistics Support Plan (ILSP) and advises the program manager on all aspects of the National Airspace Integrated Logistics Support (NAILS) Program.
7. ASSOCIATE PROGRAM MANAGER FOR AIR TRAFFIC PROCEDURES, ATP-130, is the focal point for all Air Traffic related procedures and regulations affected by the program.
8. ASSOCIATE PROGRAM MANAGER FOR QUALITY, ASU-420, provides on site quality/reliability support at the contractor's and subcontractor's facilities and performance locations.
9. ASSOCIATE PROGRAM MANAGER FOR AIR TRAFFIC REQUIREMENTS, ATR-120, provides program support to insure the program meets Air Traffic requirements.

10. ASSOCIATE PROGRAM MANAGER FOR SYSTEMS ENGINEERING,
ASE-200, addresses system issues associated with requirements and
program interfaces with the NAS.

11. ASSOCIATE PROGRAM MANAGER FOR SYSTEMS MAINTENANCE,
ASM-300, provides advice and support to the program manager
related to telecommunications network planning and
implementation.

12. ASSOCIATE PROGRAM MANAGER FOR TEST AND EVALUATION,
ACN-260, is the focal point for all program testing.

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SCOPE OF LDRCL PROJECT MANAGEMENT RESPONSIBILITIES

| ACTIVITIES | | ANC 400 | ANC 180 | ANC 420 | DECCO | ASU 420 | ASM 340 | ASM 120 | AHT 400 | AOS 200 | ACW 400 | AML 200 | AMA 400 | Region F&E Mgr | Region TMA&O Mgr | AF Sector | TOR (Site) | Contractor |
|--------------------------|---------------------|------------|------------|------------|-------|------------|------------|------------|------------|------------|------------|------------|------------|-------------------|---------------------|--------------|---------------|------------|
| Project Management | Planning | Q | Q | | | | Q | Q | | | | | | Q | | | | |
| | Scheduling | | Q | | | | | Q | | | | | | | | | | |
| | Contract | | Q | | Q | | | | | | | | | | | | | |
| Configuration Management | Funding | Q | | | | | | | | | | | | | | | | |
| | Network | | | | | | | Q | | | | | | | | | | |
| | Equipment | | Q | | | | | | | Q | | | | | Q | | | Q |
| Testing | Factory | | | | | Q | | | | | Q | | | | | | | Q |
| | Development | | Q | | | | | | | | Q | | | | | | | Q |
| | OT&E | | Q | | | | | | | | Q | | | | | | | Q |
| Acceptance | Integration | | Q | | | | | | | | Q | | | | | Q | | |
| | Shakedown | | | | | | | | | Q | | | | | | | | |
| | Contractor | | Q | | | Q | | | | | | | | | | | | Q |
| Installation | Joint | | Q | | | | | | | | | | | | | | | |
| | Site Preparation | | Q | | | | | | | | | | | | | | | |
| | Training | | Q | | | | | | | | | | | | | | | |
| Maintenance | 1st Level Support | | | | | | | | Q | | | | Q | | | | | Q |
| | 2nd Level Support | | | | | | | | | Q | | | | | | | | |
| | Funding On - Call | | Q | | | | | | | | | | | | | | | |
| Quality Assurance | Funding Depot | | Q | | | | | | | | | Q | | | | | | |
| | LDRCL Handbook | | Q | | | | | | | | | | | | | | | |
| | Network Engineering | | | | | Q | | | | | | | | | | | | Q |
| Network Operations | Network Operations | | | | | | Q | | | | | | | | | | | |
| | NAIS Support | | Q | | | Q | | | | | | | | | | | | |
| | Provisioning | Q | Q | Q | | Q | Q | | Q | Q | Q | Q | Q | Q | | Q | | Q |

Associate Program Managers
Names, Addresses and Phone Numbers

Unless otherwise indicated, all addresses are:

Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D. C. 20591

Michael Shveda, Program Manager, Interfacility Communications,
ANC-400, 202-287-7185

Jeffery Newsome, Deputy Program Manager, Interfacility
Communications , ANC-401, 202-287-7010.

Loretta Parker, Manager, Interfacility Communications Division,
ANC-800, 202-287-7158.

Son Tran, LDRCL Project Manager, ANC-800, 202-287-7172.

Anne Hellman, Associate Program Manager for Contracting, DECCO,
618-256-9594. DECCO/RFPA.MF
Scott AFB, IL

E. K. Reed, Associate Program Manager for Logistics, ANS-420,
202-267-7432.

Wayne Bell, Associate Program Manager for Testing, ACW-400A, 609-
485-5271. FAA Technical Center
Atlantic City Airport
Atlantic City, NJ 08405

Alan Hanson, Associate Program Manager for Systems Maintenance,
ASM-320, 202-267-9166.

Richard McCarthy, Associate Program Manager for Legal, AGC-510,
202-267-7368.

Dawna Smith, Associate Program Manager for Air Traffic
Procedures, ATP-130, 202-267-9125.

Isaac Curtis, Associate Program Manager for Air Traffic
Requirements, ATR-126, 202-267-9183.

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Gerald Patenaude, Associate Program Manager for Quality, ASU-426D, 407-984-5542. Federal Aviation Administration
c/o Harris Corp. GISD
P.O. Box 98000 W-1/FAA
Melbourne, FL 32902

Dawn Able, Associate Program Manager for Systems Engineering, SEI, 202-646-5322.

Ron Reed, Alcatel Program Manager, 214-996-7767.
Alcatel Network Systems
790 Glenville Road
Richardson, TX 75081

Information Systems and Networks (ISN) Corporation, Primary Support Contractor, 202-479-0085.
10411 Motor City Drive
Bethesda, MD 20817

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APPENDIX 4. EQUIPMENT CONFIGURATION

This appendix depicts the configuration of the equipment in the racks by Contract Line Item Number (CLIN).

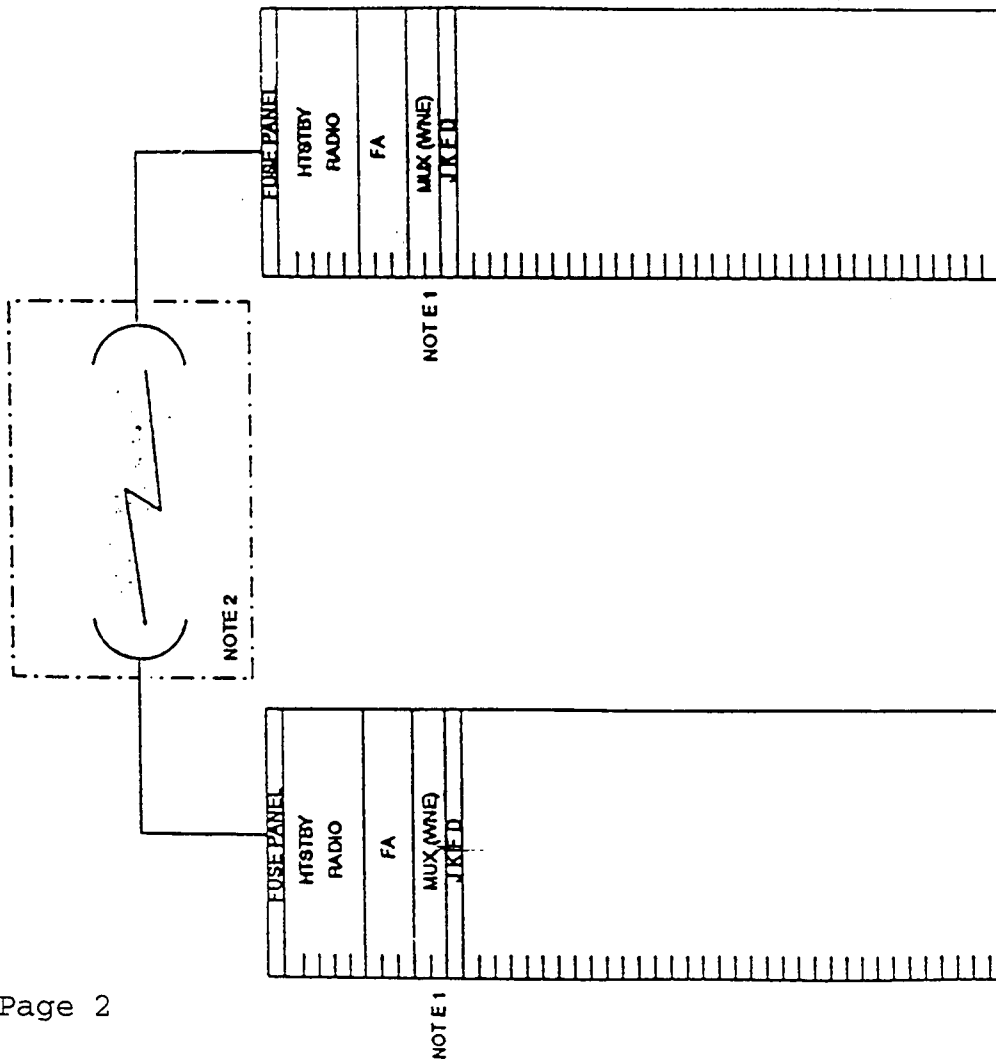
7/27/93

NOTE 1: ANALOG MULTIPLEX AVAILABLE
UNDER SEPERATE CLIN NO.
NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0001AA MAJOR EQUIPMENT:

RADIO:

- ✓ MICROWAVE DATA SYSTEMS MDS-880
- ✓ FAULT ALARM:
- ✓ WESTRONICS WS-2000
- 6 W J A C K F I E L D
- ✓ TRIM 767-0029-001



SINGLE CHANNEL 932 MHz ANALOG TERMINAL LINK

CLIN 0001AA

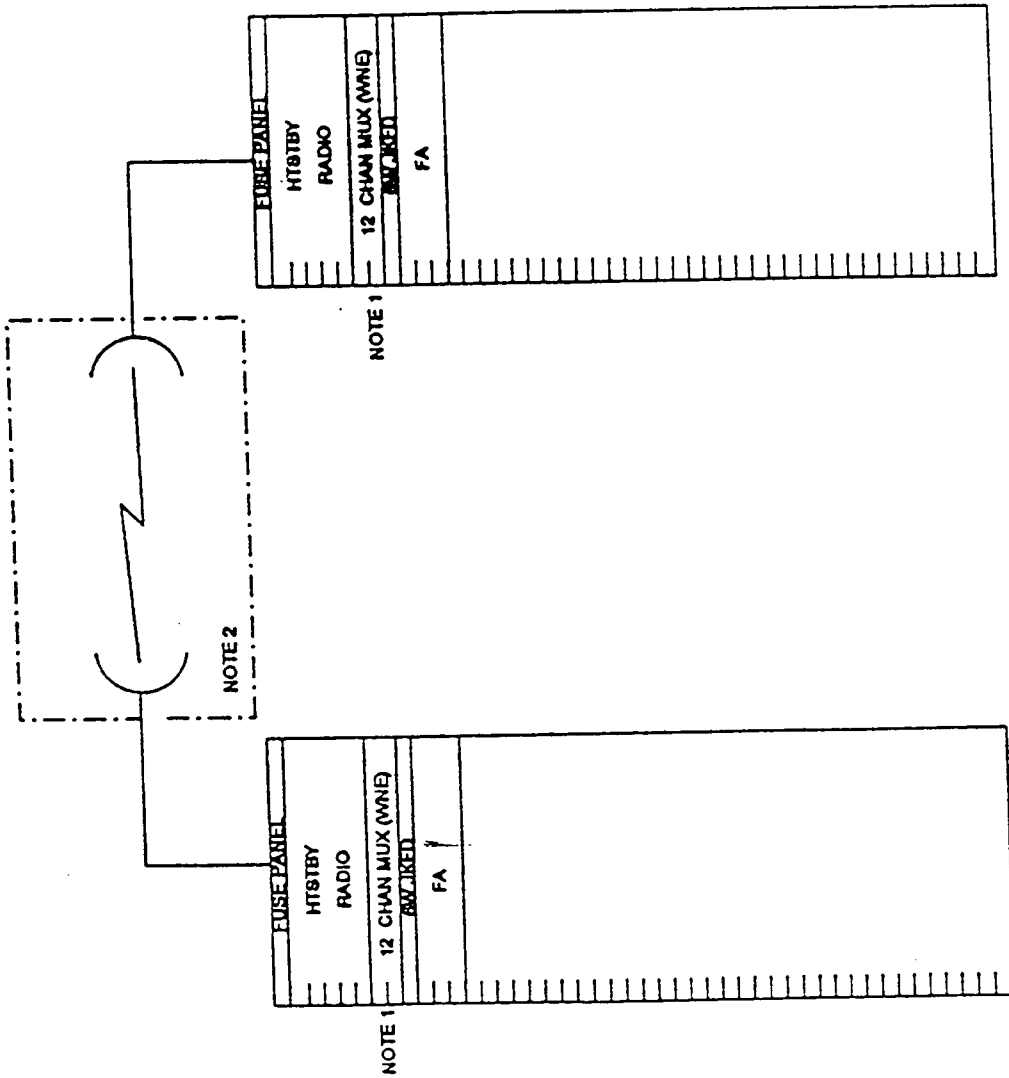
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Appendix 4

NOTE 1: ANALOG MULTIPLEX AVAILABLE
UNDER SEPERATE CLIN NO.
NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0001AB MAJOR EQUIPMENT:

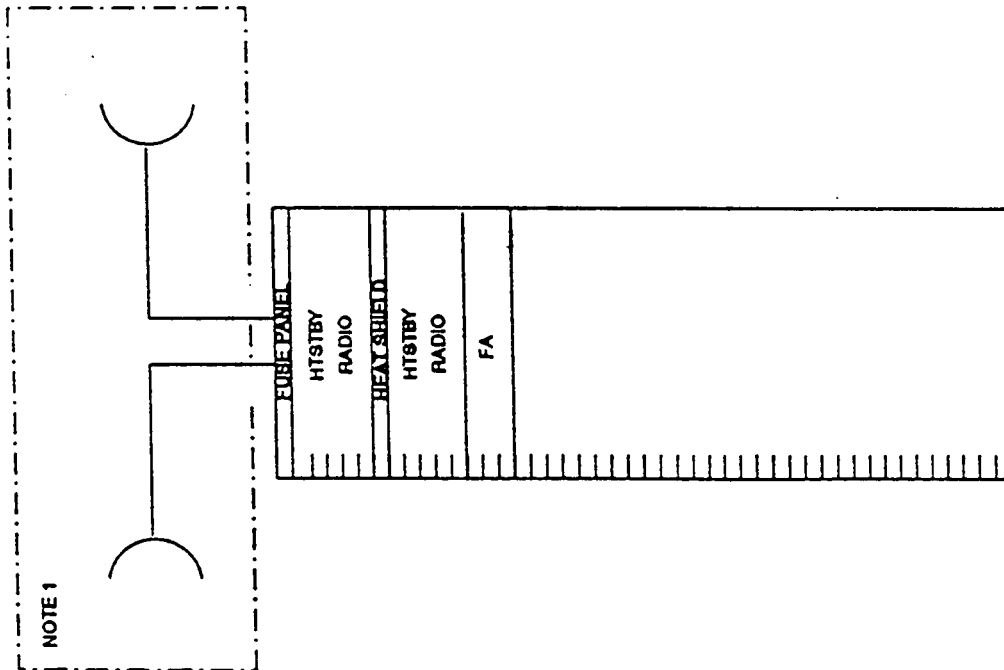
RADIO: MICROWAVE DATA SYSTEMS MDS-900
FAULT ALARM: WESTRONICS WS-2000
6 W JACKFIELD:
TRIM 787-0029-001



2,6, OR 12 CHANNEL 932 MHZ ANALOG TERMINAL LINK
CLIN 0001AB

7/27/93

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



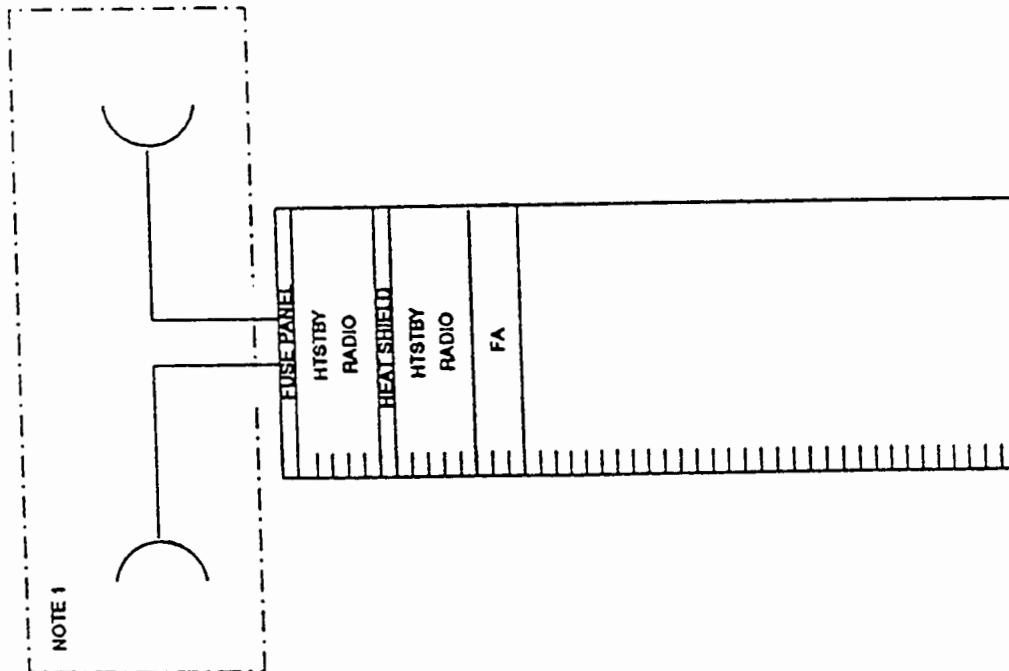
CLIN 0001AC MAJOR EQUIPMENT:
RADIO: MICROWAVE DATA SYSTEMS MDS-990
FAULT ALARM: WESTRONICS WS-2000

SINGLE CHANNEL 932 MHz ANALOG REPEATER
CLIN 0001AC

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0001AD MAJOR EQUIPMENT:

RADIO: MICROWAVE DATA SYSTEMS MDS-060
FAULT ALARM: WESTRONICS WS-2000

2, 6, OR 12 CHANNEL 932 MHZ ANALOG REPEATER WITH NO D/I

CLIN 0001AD

7/27/93

2aa1.gem 12-1-91

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UNDER SEPERATE CLIN NO.

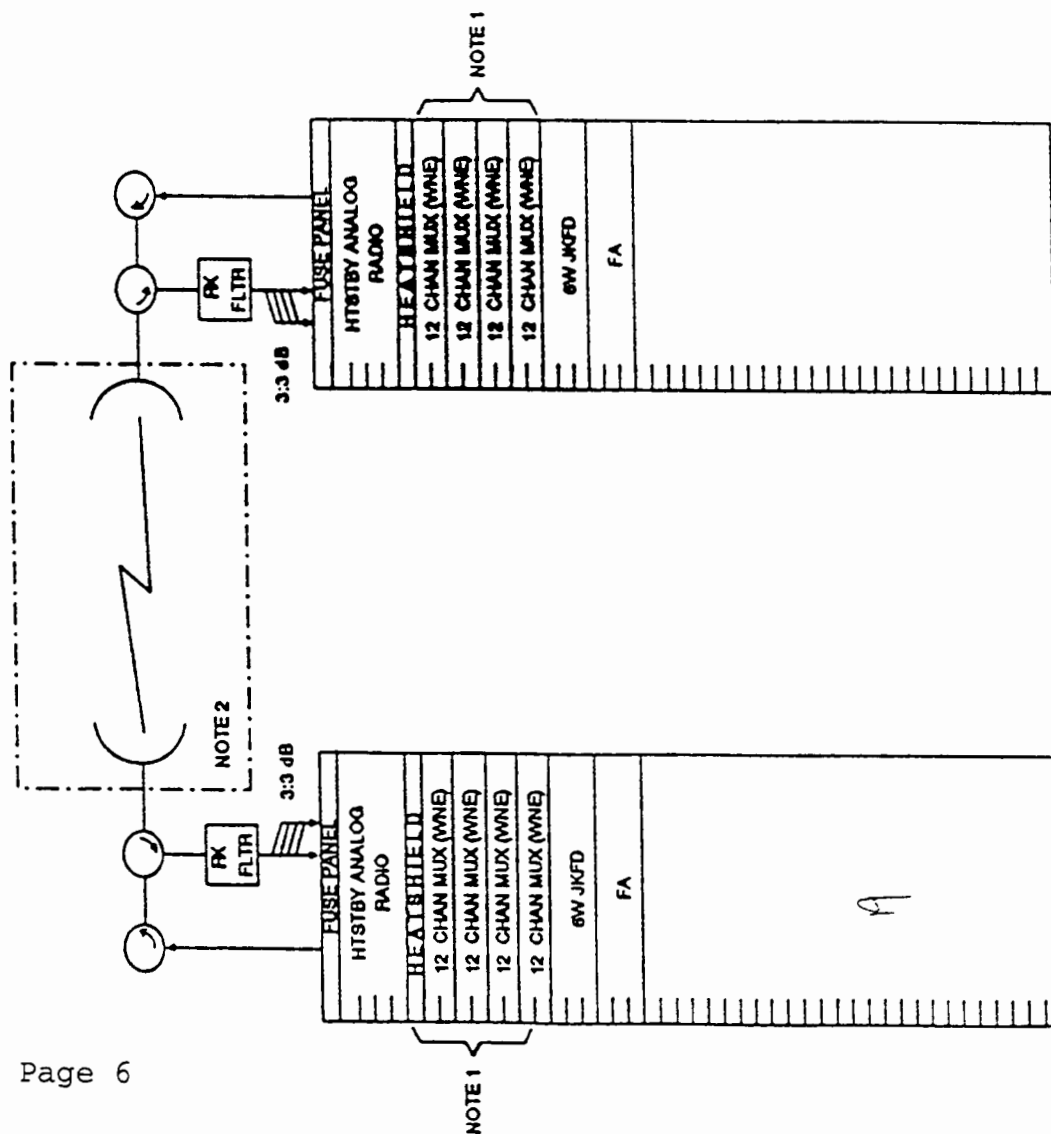
NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AA1 MAJOR EQUIPMENT:

RADIO:
— WESTERN MULTIPLEX ONE:2000

FAULT ALARM:
— WESTRONICS WS-2000

6 W JACKFIELD:
— ADC JC848M



1.8 GHz 48 CHANNEL DM ANALOG TERMINAL LINK
CLIN 0002AA1

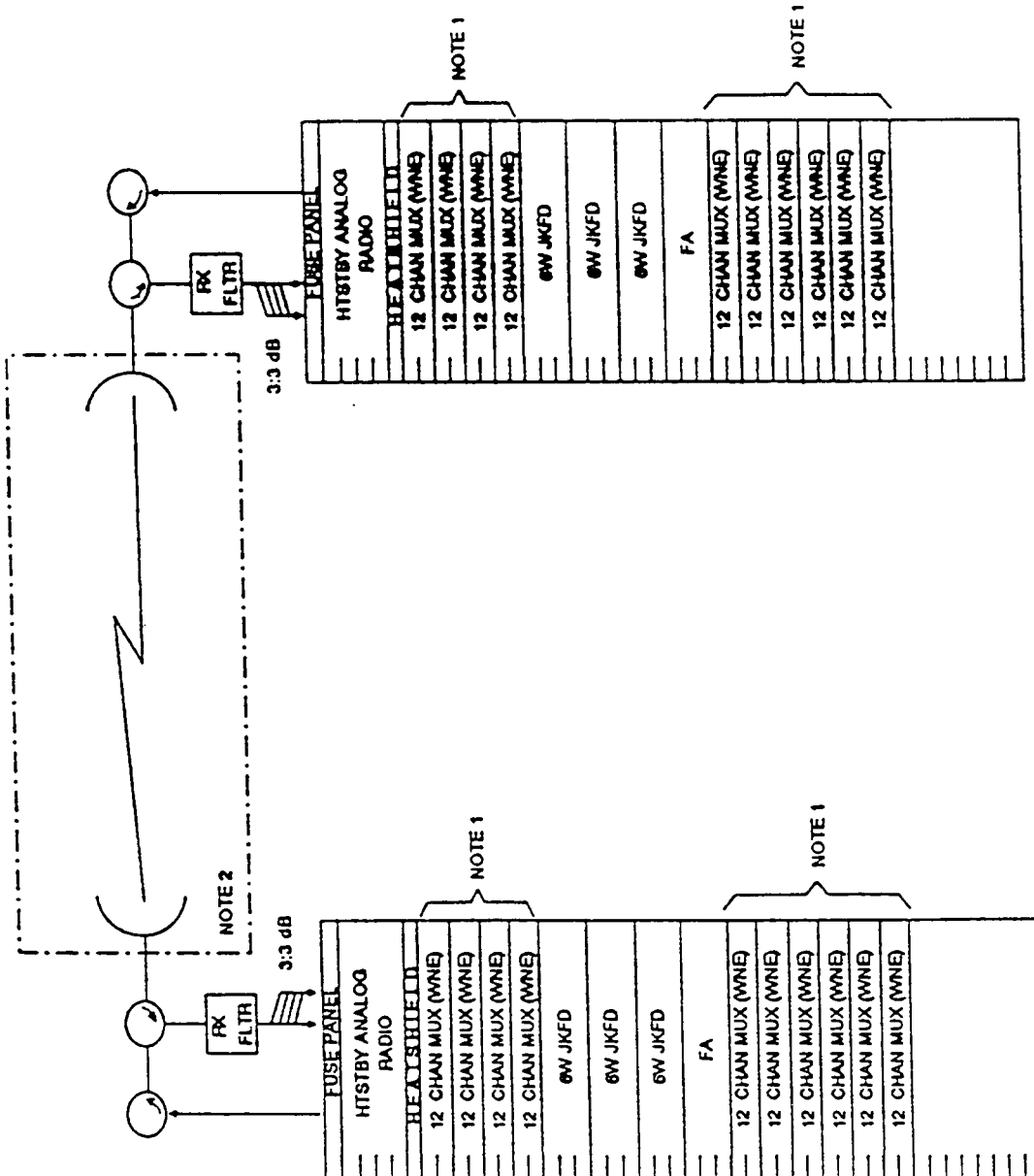
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6540.8
Appendix 4

NOTE 1: ANALOG MULTIPLEX AVAILABLE
UNDER SEPERATE CLIN NO.
NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

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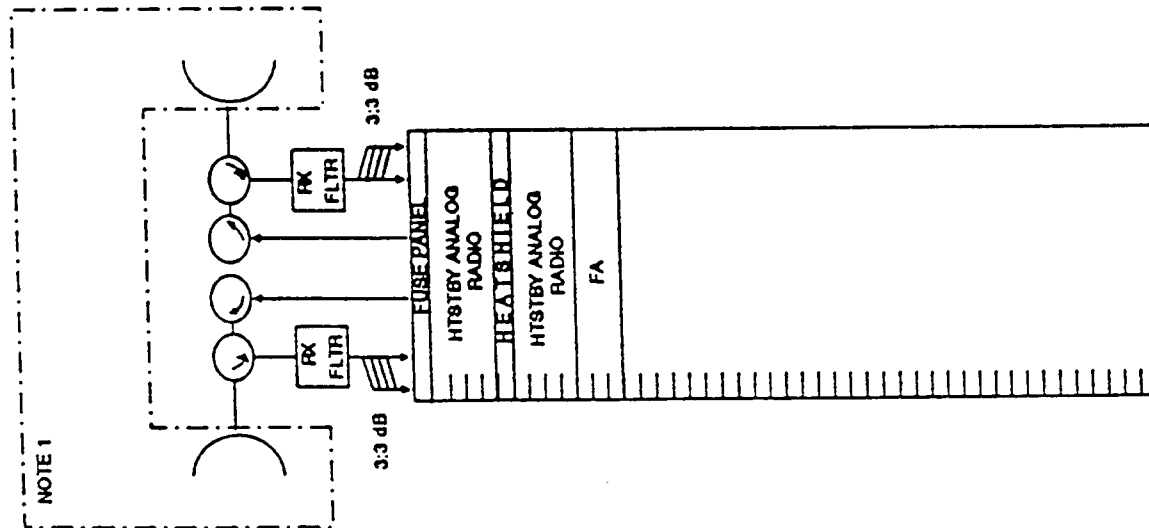
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FAULT ALARM: WESTRONICS WS-2000
6 W JACKFIELD: ADC JC6/48 M



1.8 GHz 120 CHANNEL DM ANALOG TERMINAL LINK
CLIN 0002AA2

7/27/93

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



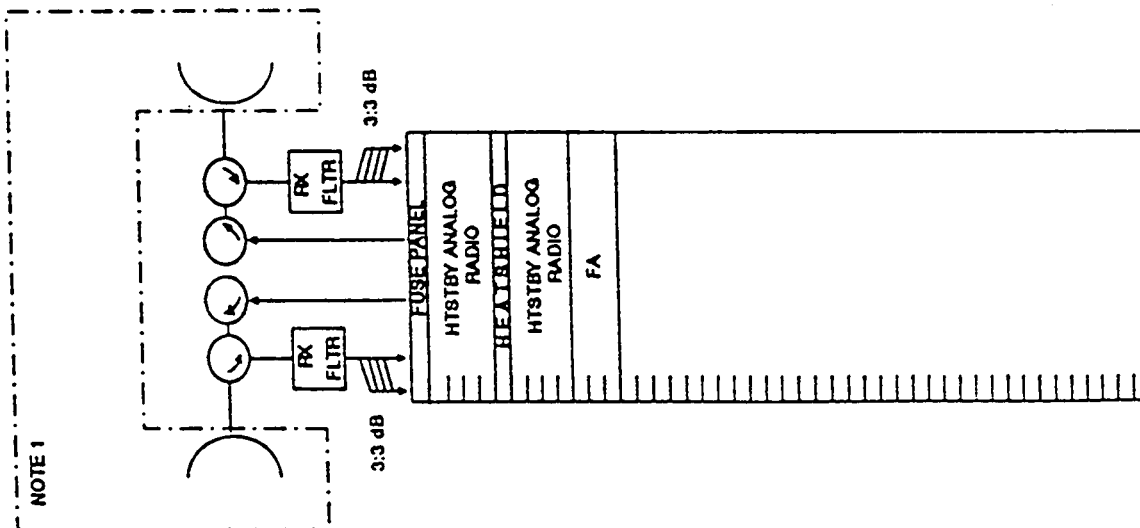
CLIN 0002AB1 MAJOR EQUIPMENT:
RADIO: WESTERN MULTIPLEX ONE-2000
FAULT ALARM: WESTRONICS WS-2000

1.8 GHZ 48 CHANNEL ANALOG REPEATER WITH NO D/I
CLIN 0002AB1

7/27/93

6540.8
Appendix 4

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0002AB2 MAJOR EQUIPMENT:
RADIO: WESTERN MULTIPLEX ONE 2000
FAULT ALARM: WESTRONICS WS-2000

1.8 GHz 120 CHANNEL ANALOG REPEATER WITH NO D/A

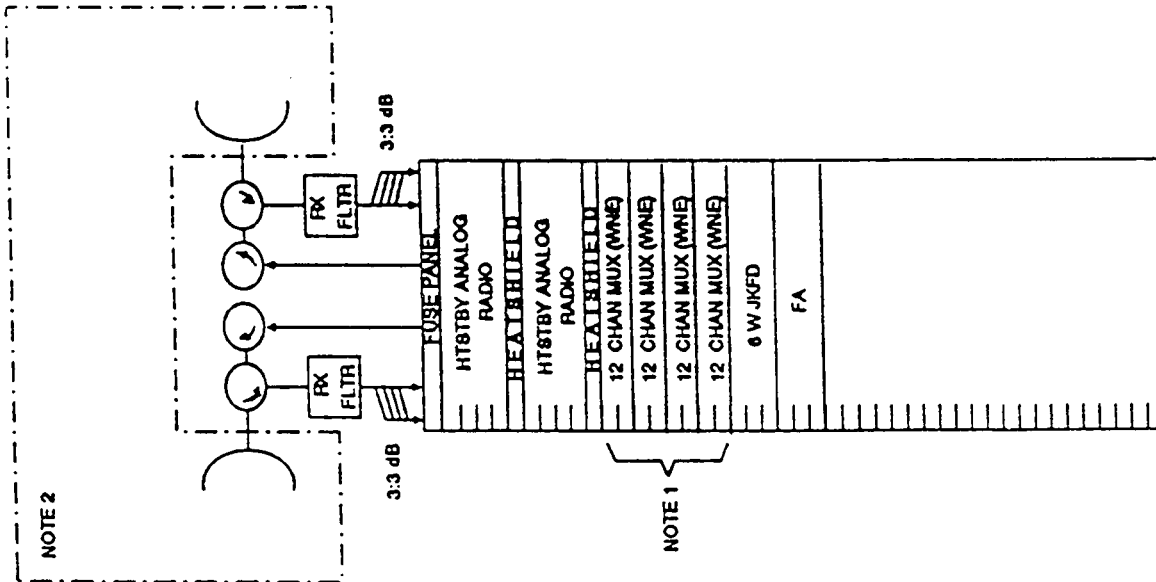
CLIN 0002AB2

7/27/93

NOTE 1: ANALOG MULTIPLEX AVAILABLE
UNDER SEPERATE CLIN NO.
NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AC1 MAJOR EQUIPMENT:

RADIO:
WESTERN MULTIPLEX ONE-2000
FAULT ALARM:
WESTRONICS WS-2000
6 W JACKFIELD:
ADC JC6/46M



1.8 GHZ 48 CHANNEL DJ1 ANALOG REPEATER
CLIN 0002AC1

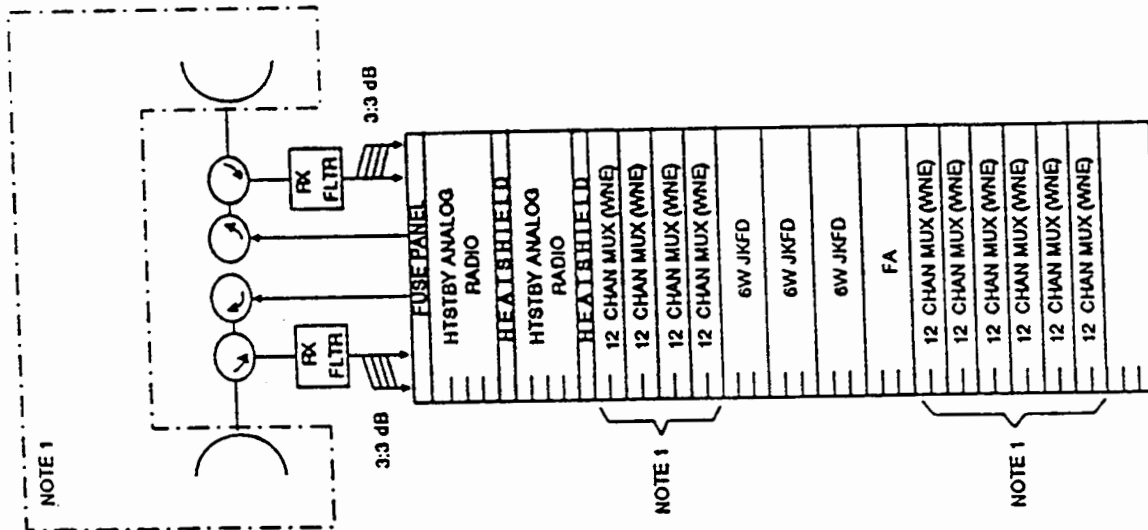
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NOTE 1: ANALOG MULTIPLEX AVAILABLE
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NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

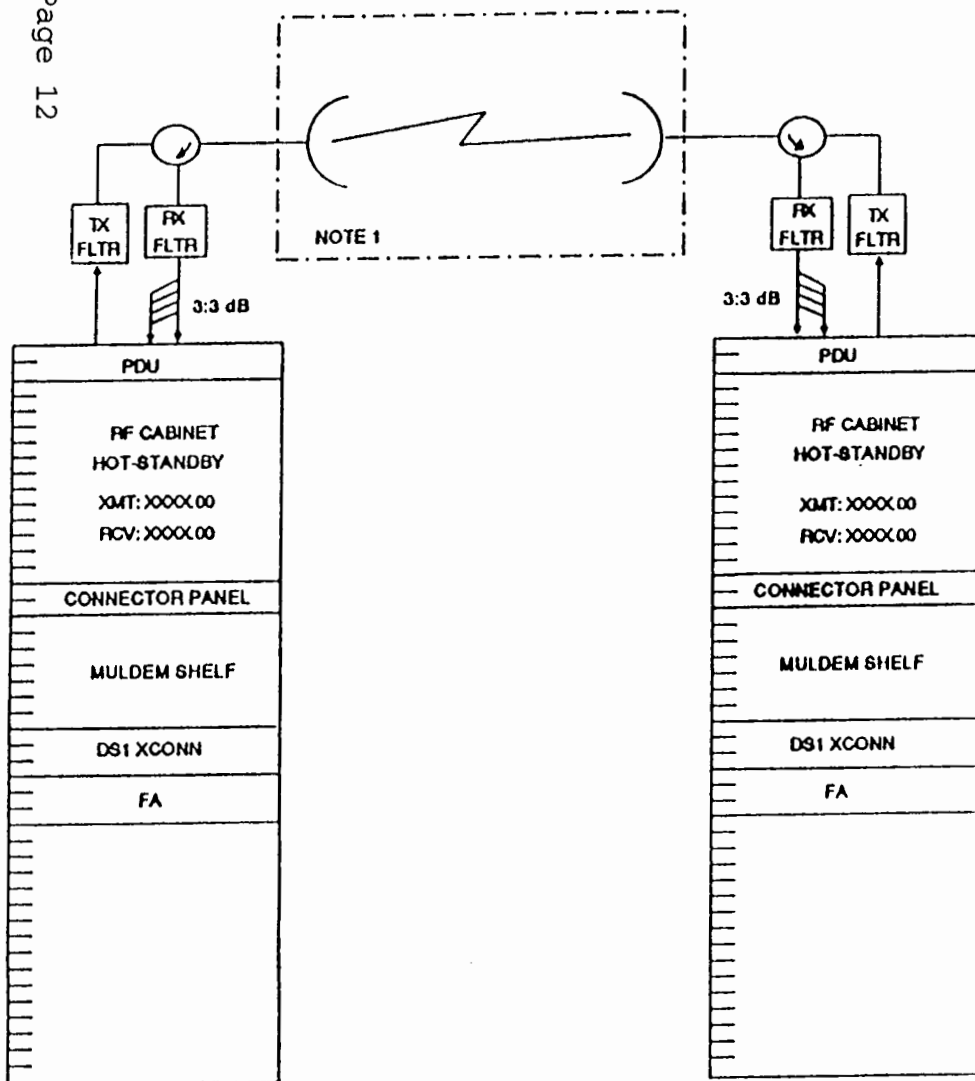
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RADIO: WESTERN MULTIPLEX ONE:2000
FAULT ALARM: WESTRONICS WS-2000
6 W JACKFIELD: ADC JC6/40M



1.8 GHZ 120 CHANNEL D/A ANALOG REPEATER

CLIN 0002AC2

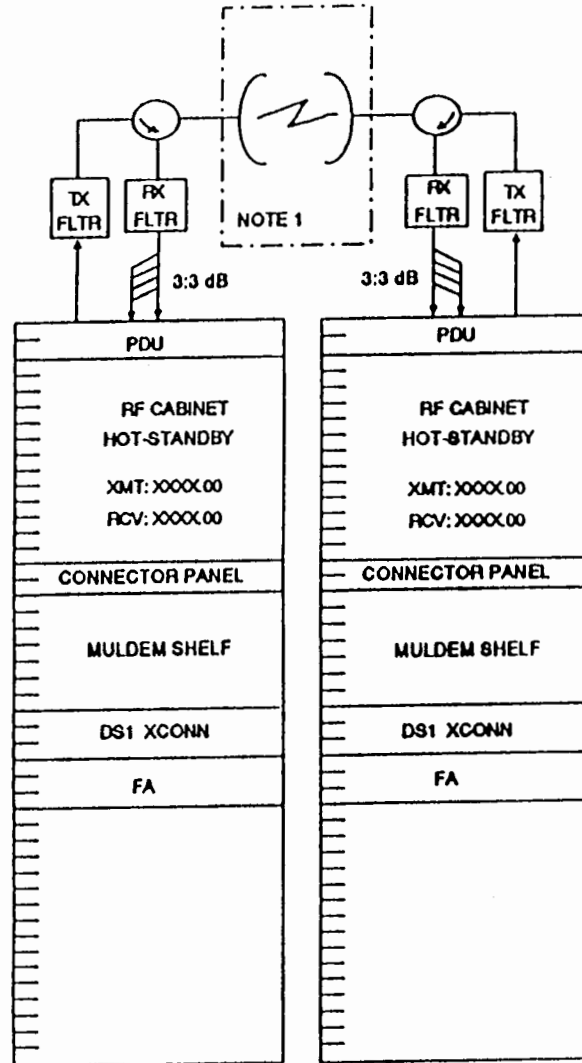


1.8 GHZ 1 DS1 DIGITAL TERMINAL LINK
CLIN 0002AE

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AE MAJOR EQUIPMENT:

RADIO:
/ ALCATEL MDR-5302
FAULT ALARM:
WESTRONICS WS-2000
DS1 CROSSCONNECT:
/ TELECT 010-2604-313

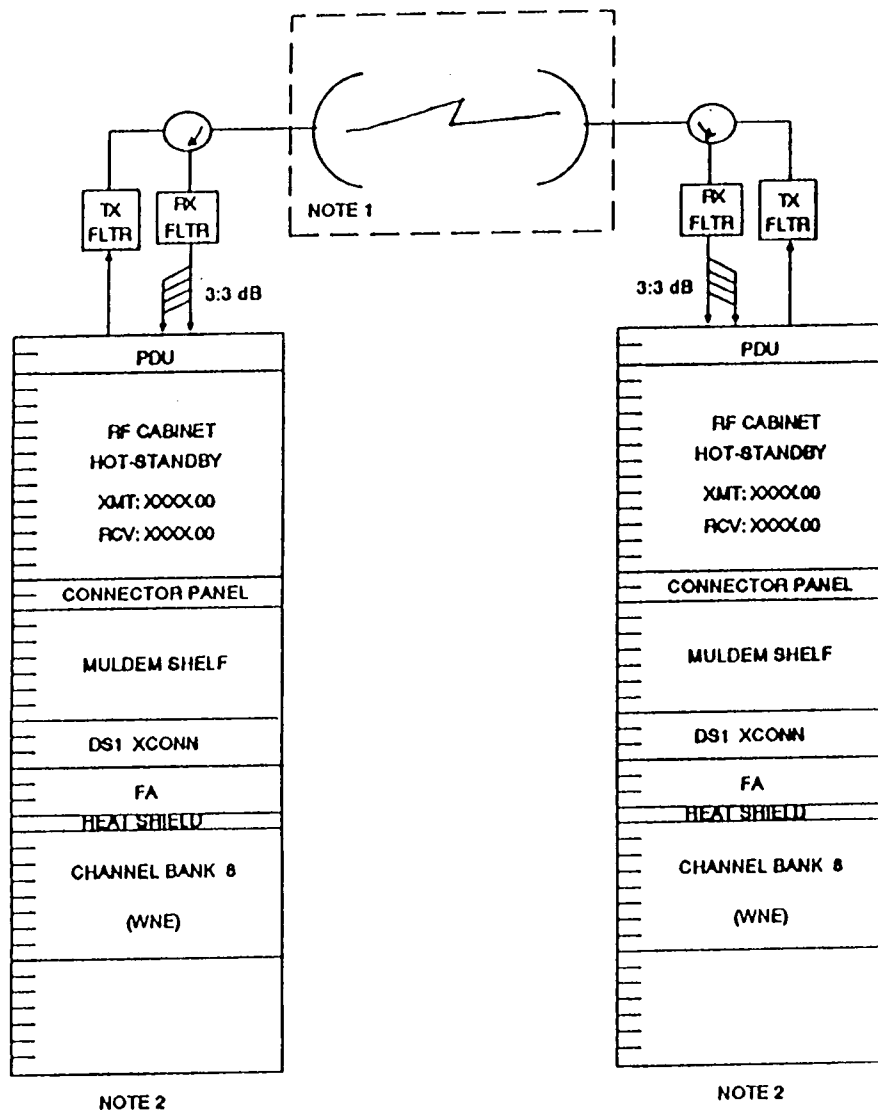


NOTE 1: ANTENNAS AVAILABLE UNDER SEPERATE CLIN NO.

CLIN 0002AF MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5302
FAULT ALARM:
WESTRONICS WS-2000
DS1 CROSSCONNECT:
TELECT 010-2604-313

1.8 GHZ 4 DS1 DIGITAL TERMINAL LINK
CLIN 0002AF



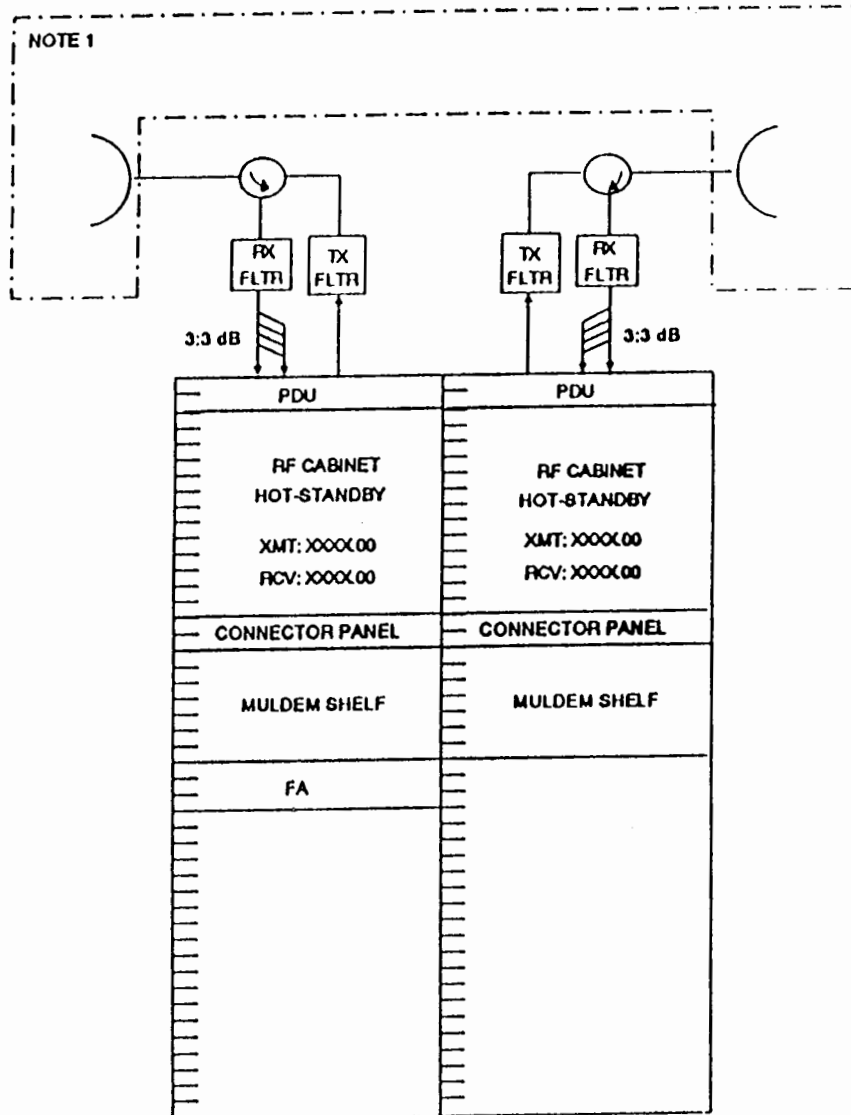
1.8 GHZ 8 DS1 DIGITAL TERMINAL LINK
CLIN 0002AG

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

NOTE 2: CHANNEL BANK ASSY AVAILABLE
UNDER CLIN NO. 0017AE

CLIN 0002AG MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5202
FAULT ALARM:
WESTRONICS WS-2000
DS1 CROSSCONNECT:
TELECT 010-2804-313

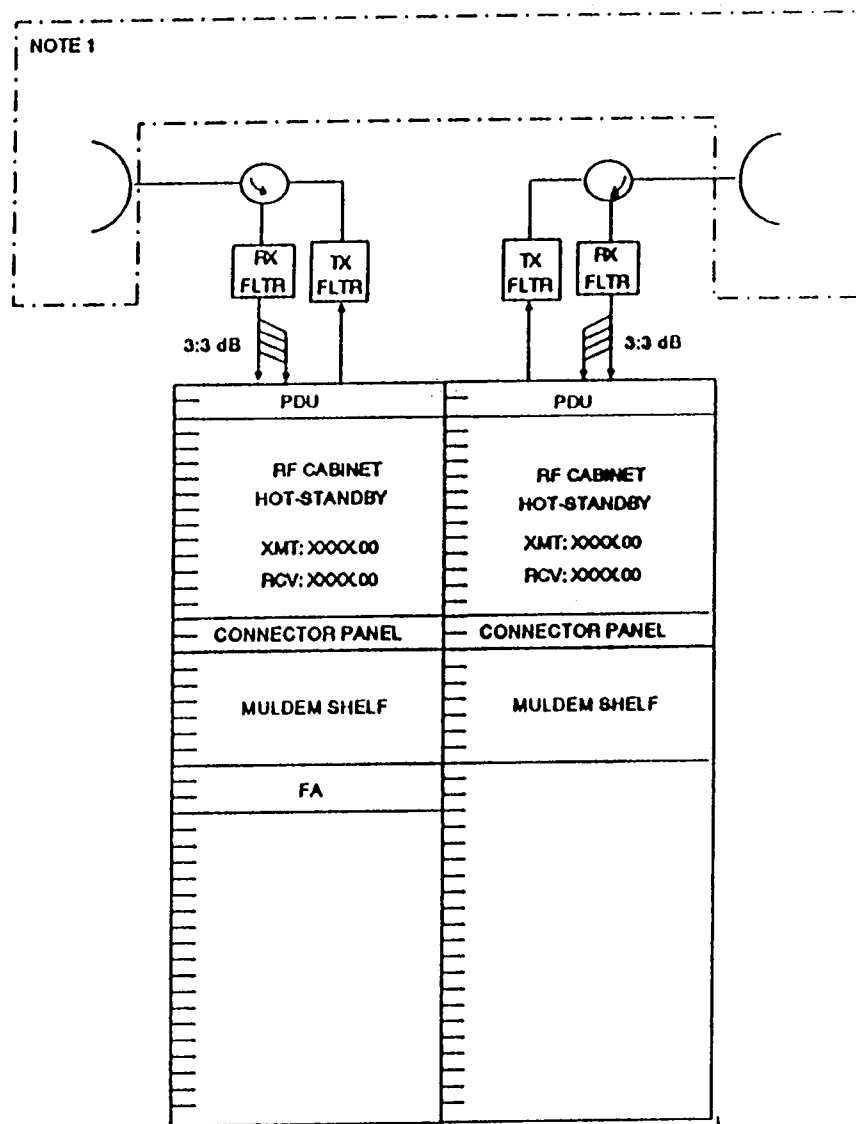


NOTE 1: ANTENNAS AVAILABLE UNDER SEPERATE CLIN NO.

CLIN 0002AH MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5302
FAULT ALARM:
WESTRONICS WS-2000

1.8 GHZ 1 DS1 WITH NO D1 DIGITAL REPEATER
CLIN 0002AH



1.8 GHZ 4 DS1 WITH NO D1 DIGITAL REPEATER
CLIN 0002AJ

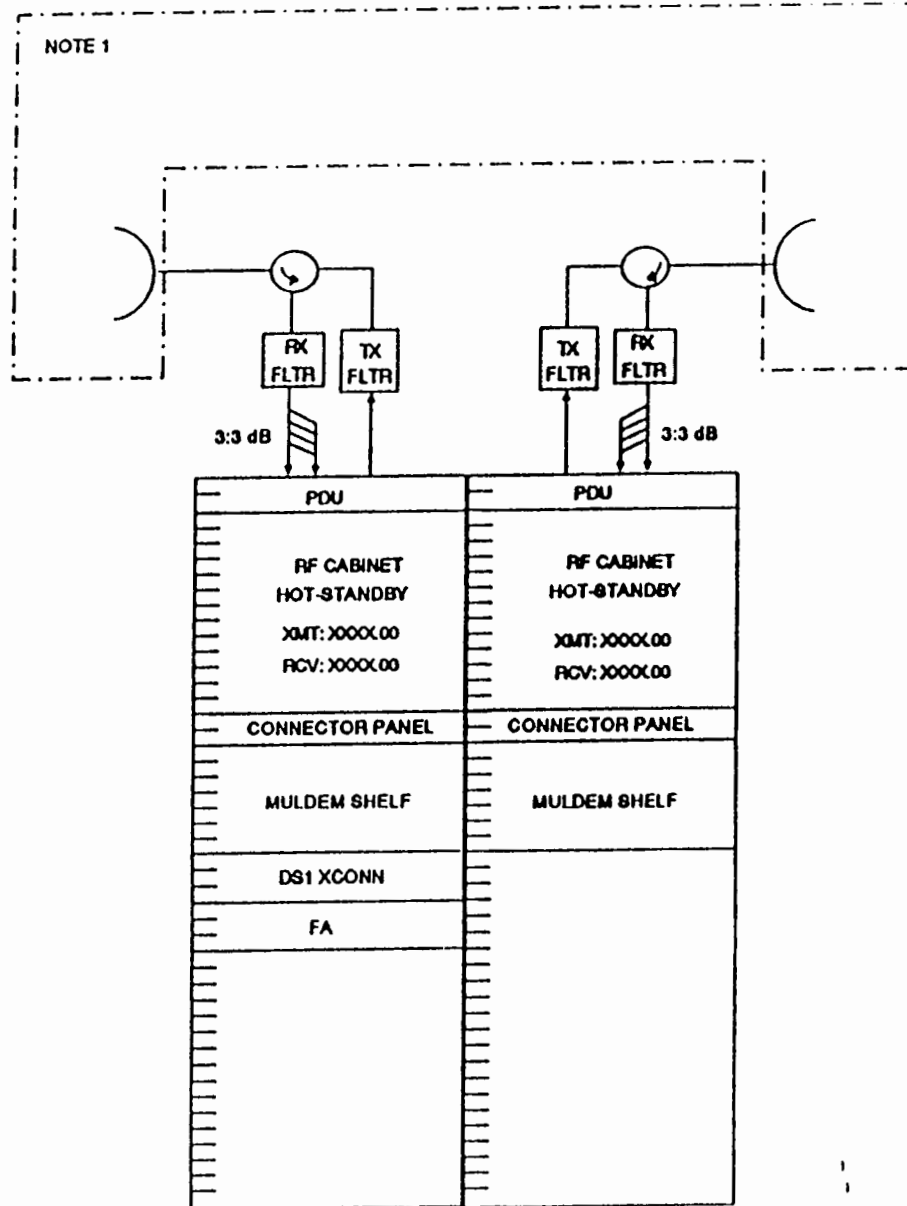
NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AJ MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5302
FAULT ALARM:
WESTRONICS WS-2000

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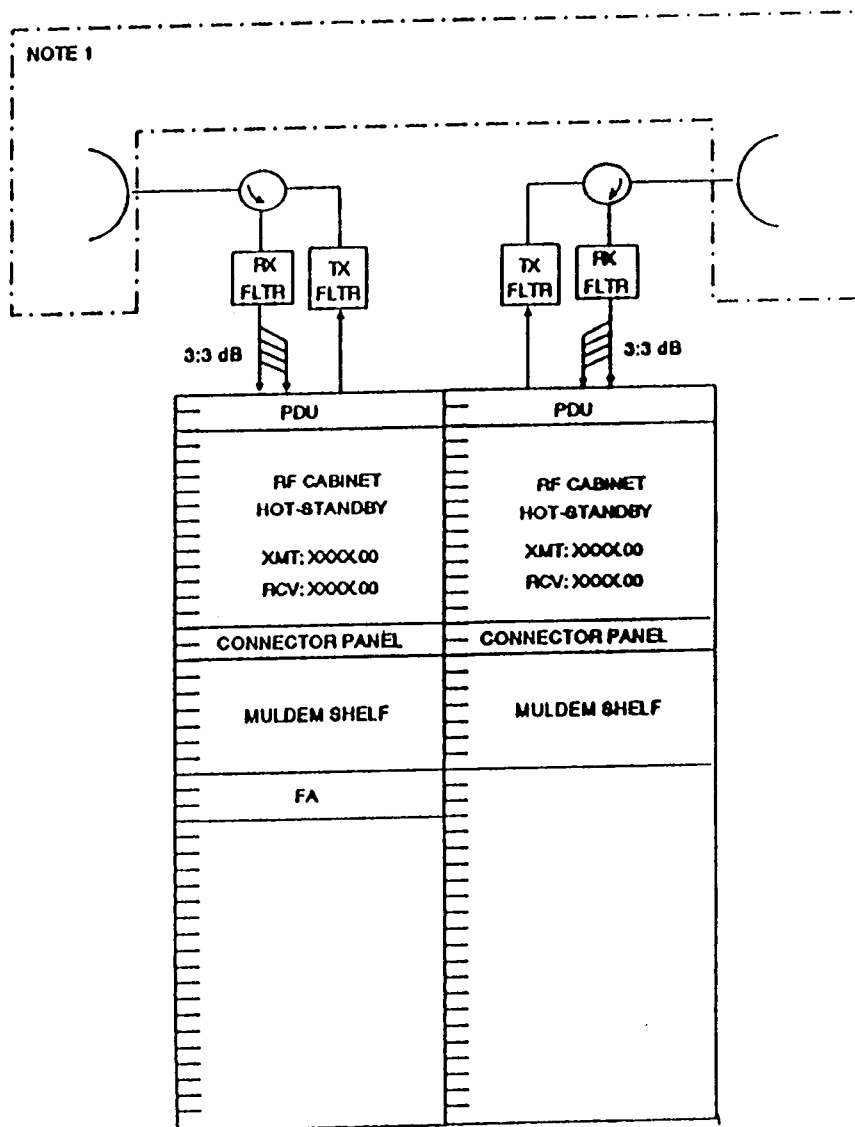
NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0002AL MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5302
FAULT ALARM:
WEBTRONICS WS-2000
DS1 CROSSCONNECT:
TELECT 010-2604-301 ?

1.8 GHZ 1 DS1 D1 DIGITAL REPEATER
CLIN 0002AL

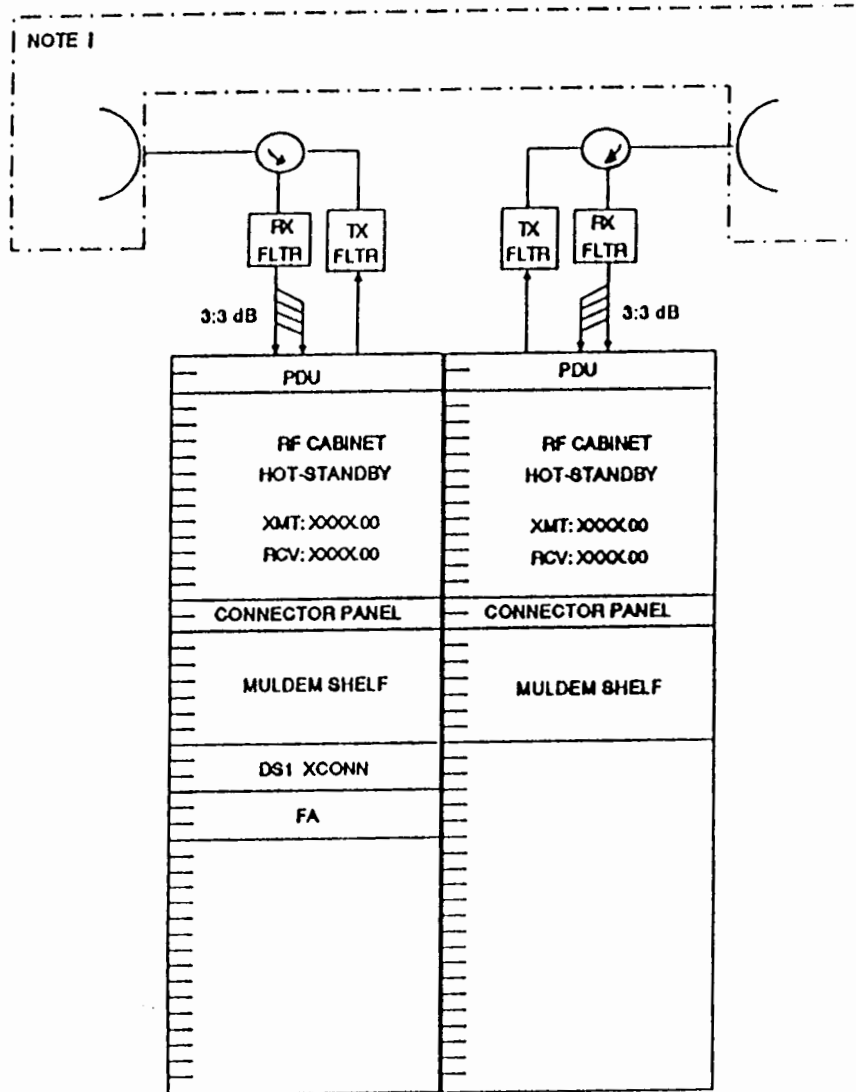


1.8 GHZ 8 DS1 WITH NO D1 DIGITAL REPEATER
CLIN 0002AK

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AK MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5202 ?
FAULT ALARM:
WESTRONICS WS-2000

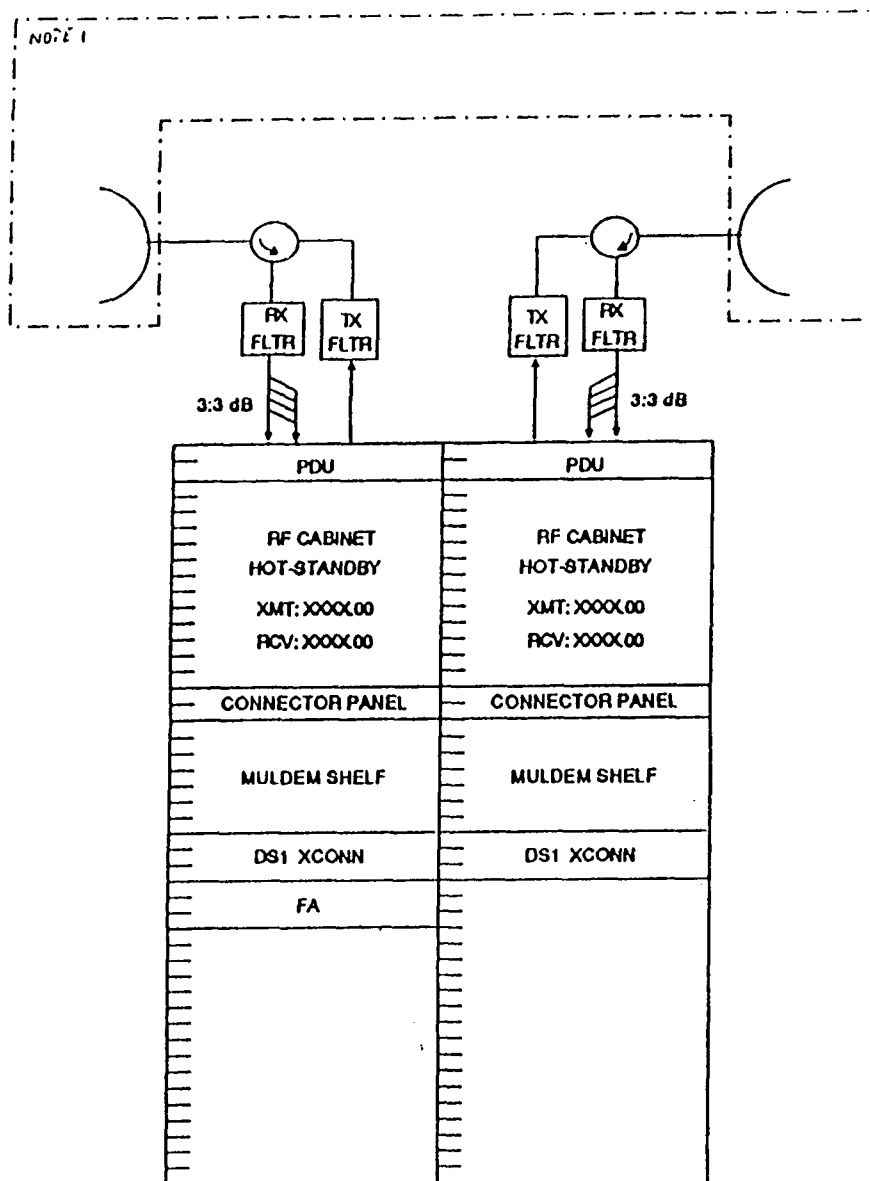


NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AM MAJOR EQUIPMENT:

RADIO:
ALCATEL MDR-5302
FAULT ALARM:
WESTRONICS WS-2000
DS1 CROSSCONNECT:
TELECT 010-2004-301

1.8 GHZ 4 DS1 DIGITAL REPEATER WITH 4 DS1 D/I
CLIN 0002AM



1.8 GHZ 8 DS1 DIGITAL D1 REPEATER

CLIN 0002AN

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0002AN MAJOR EQUIPMENT:

RADIO:

ALCATEL MDR-5202

FAULT ALARM:

WESTRONICS WS-2000

DS1 CROSSCONNECT:

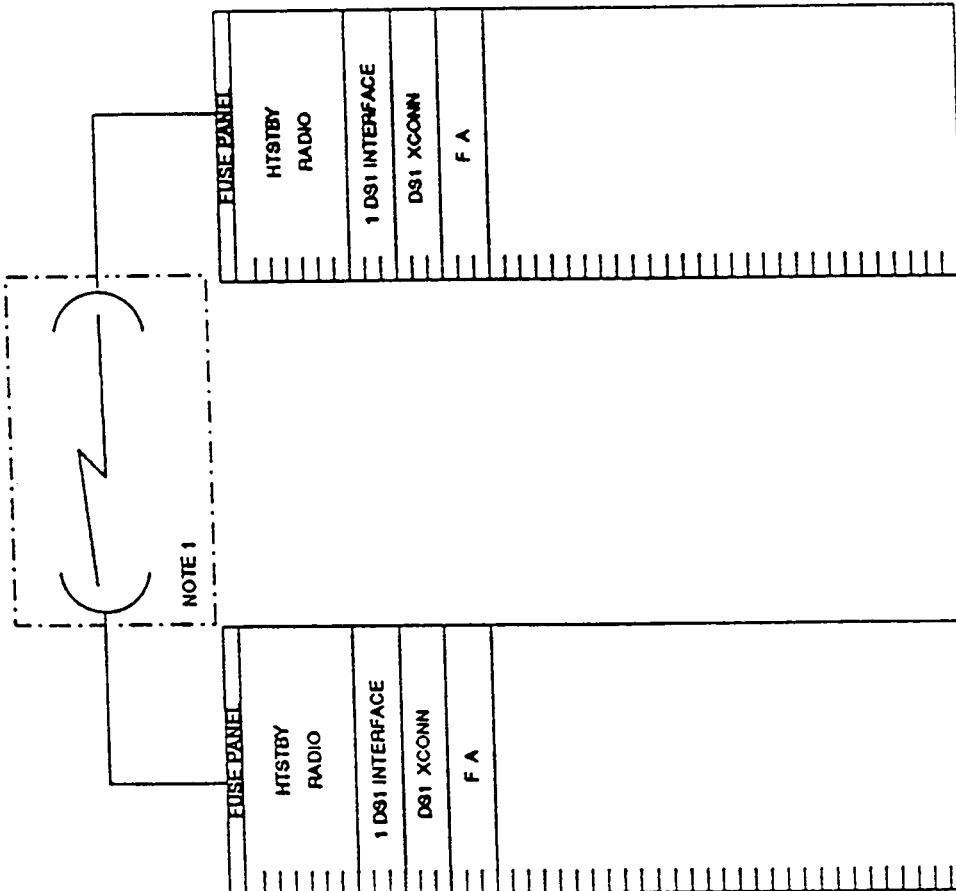
TELECT 010-2604-301

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0003AA MAJOR EQUIPMENT:
RADIO:
✓ MICROWAVE NETWORKS MN-23
DS1 CROSSCONNECT:
TELECT 010-2604-0313
FAULT ALARM:
WESTRONICS WS-2000

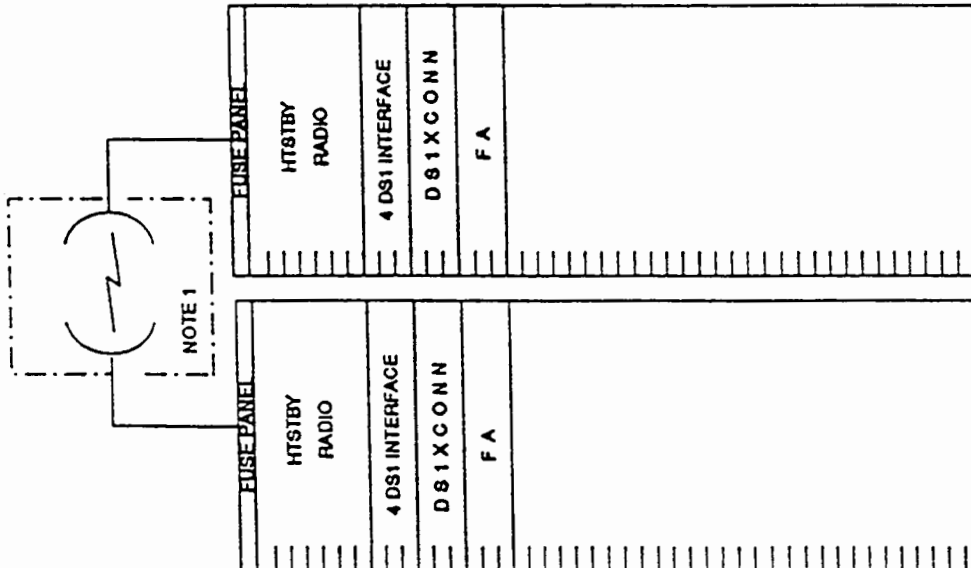


23 GHZ 1 DS1 DIGITAL TERMINAL LINK
CLIN 0003AA

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

CLIN 0003AB MAJOR EQUIPMENT:
RADIO:
MICROWAVE NETWORKS MN-23
DS1 CROSSCONNECT:
TELECT 010-2604-0313
FAULT ALARM:
WESTRONIC WS-2000

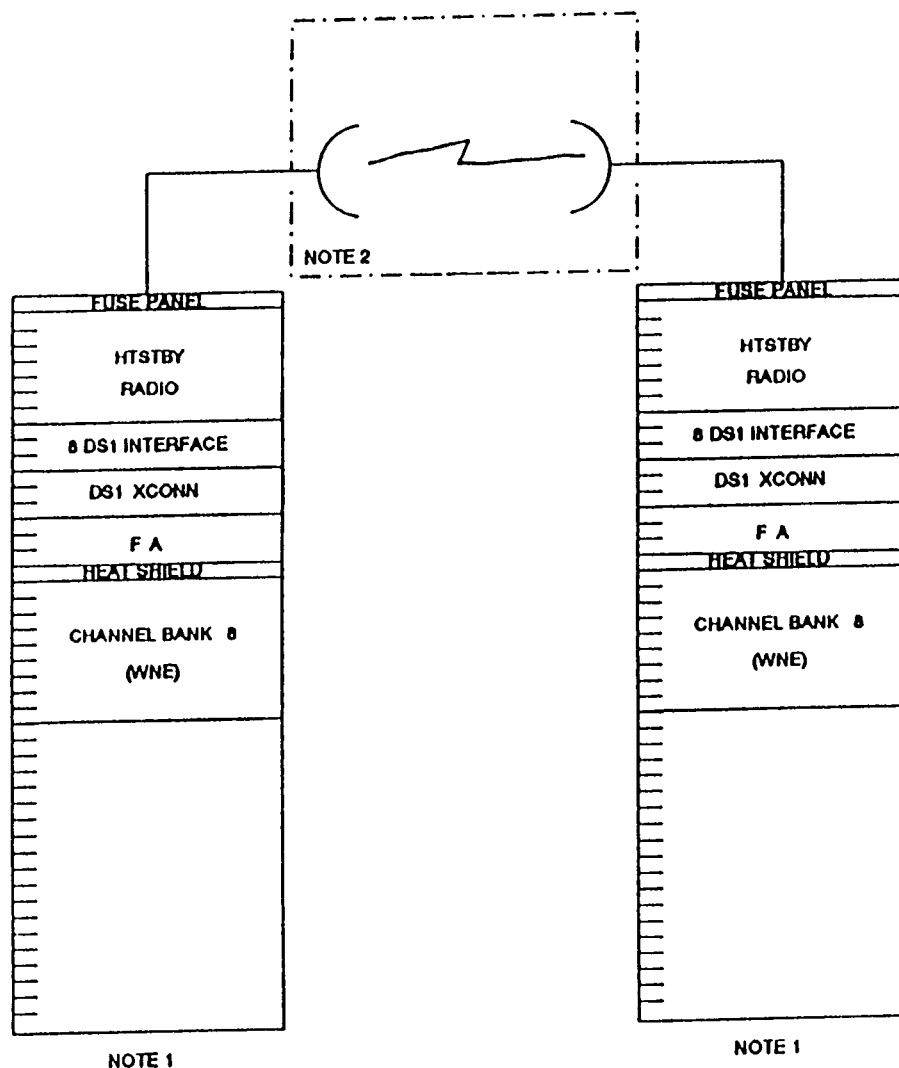


23 GHZ 4 DS1 DIGITAL TERMINAL LINK
CLIN 0003AB

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NOTE 1: CHANNEL BANK ASSY AVAILABLE
UNDER CLIN NO. 0017AL

NOTE 2: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0003AC MAJOR EQUIPMENT:

RADIO:
MICROWAVE NETWORKS MN-23

DS1 CROSSCONNECT:
TELECT 010-2604-0313

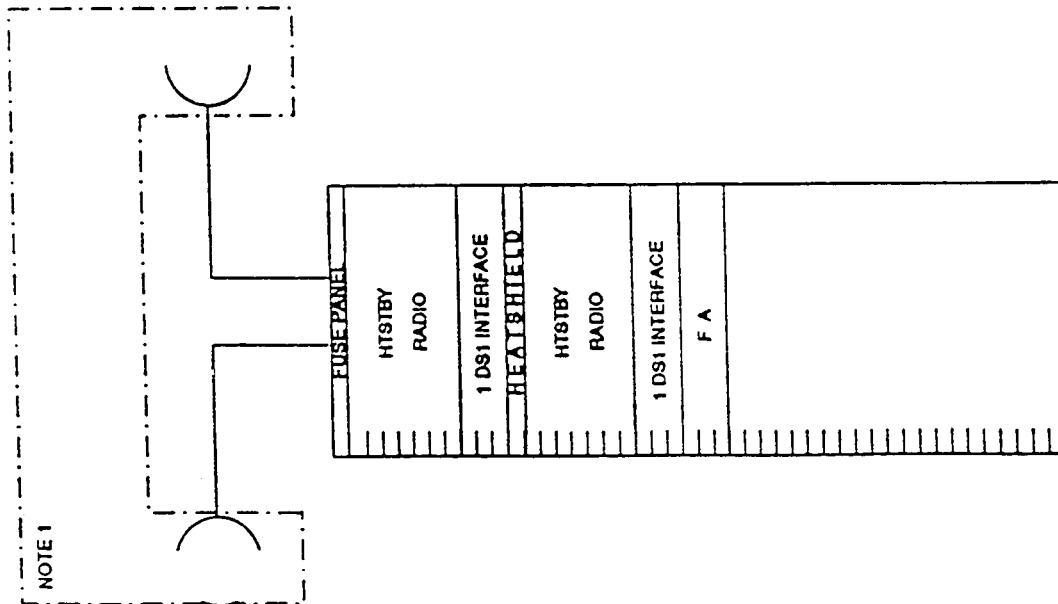
FAULT ALARM:
WESTRONICS WS-2000

23 GHZ 8 DS1 DIGITAL TERMINAL LINK
CLIN 0003AC

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



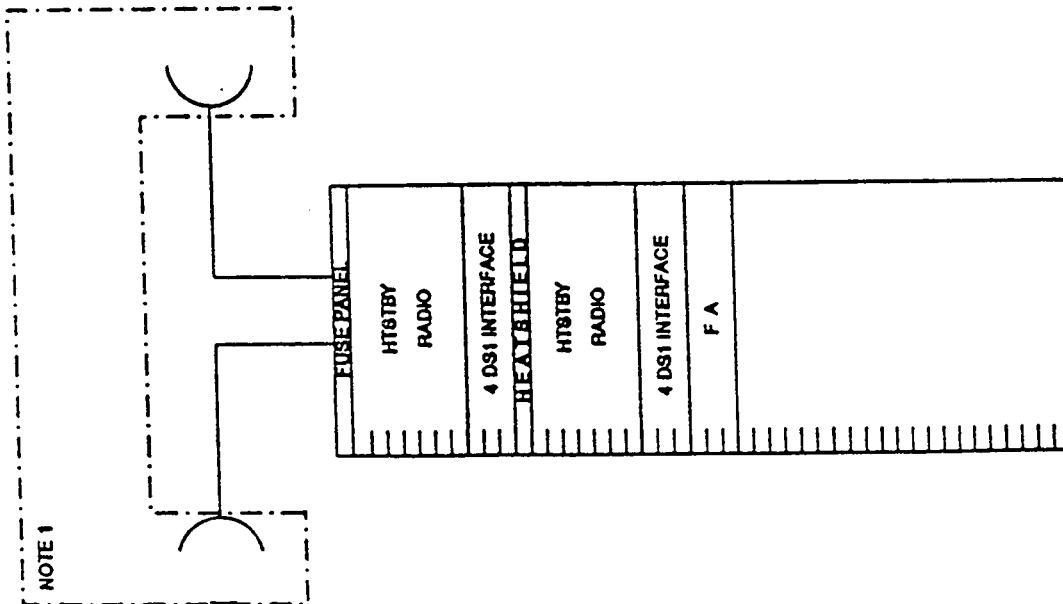
CLIN 0003AD MAJOR EQUIPMENT:
RADIO:
MICROWAVE NETWORKS MN-23
FAULT ALARM:
WESTRONICS W8-2000

23 GHZ 1 DS1 DIGITAL REPEATER WITH NO D/A
CLIN 0003AD

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

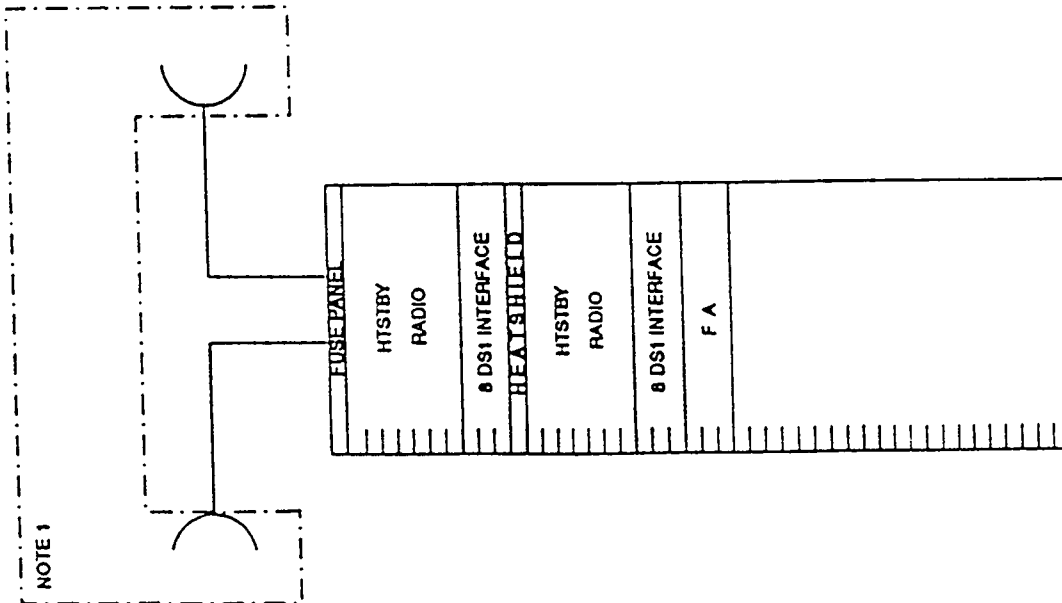


CLIN 0003AE MAJOR EQUIPMENT:
RADIO: MICROWAVE NETWORKS MN-23
FAULT ALARM: WESTRONICS WS-2000

23 GHz 4 DS1 DIGITAL REPEATER WITH NO DA
CLIN 0003AE

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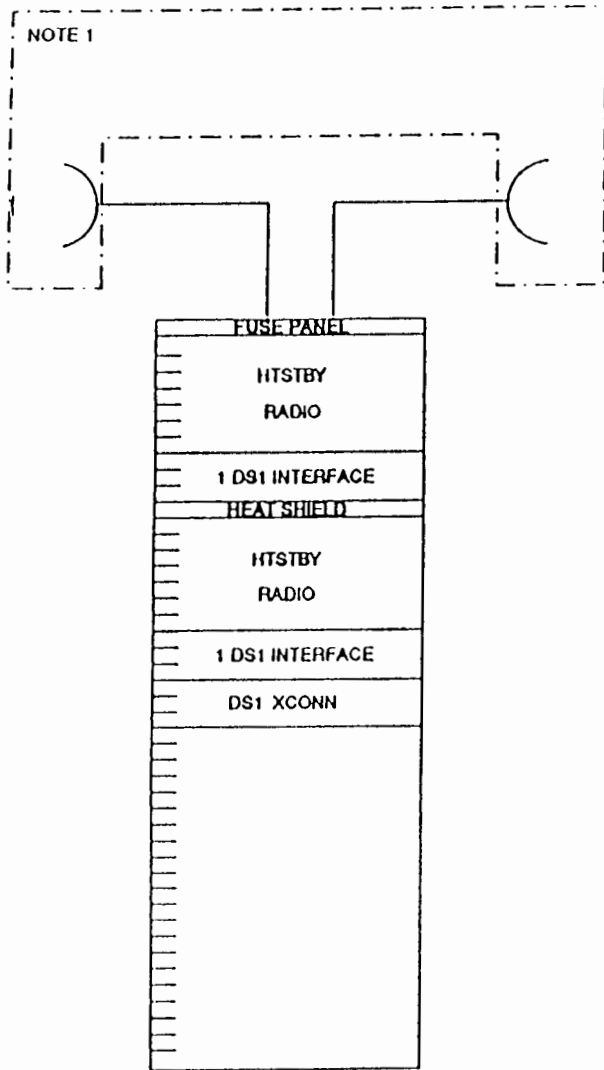
NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0003AF MAJOR EQUIPMENT:
RADIO: MICROWAVE NETWORKS MN-23
FAULT ALARM: WESTRONICS WS-2000

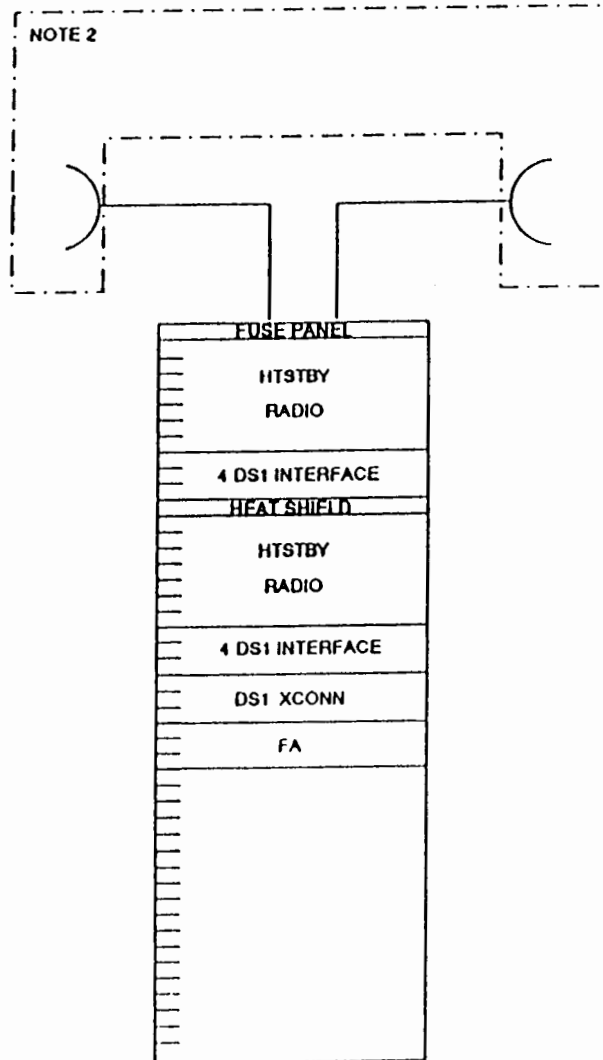
23 GHz 8 DS1 DIGITAL REPEATER WITH NO DI/
CLIN 0003AF

NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.



CLIN 0003AG MAJOR EQUIPMENT:
RADIO:
MICROWAVE NETWORKS MN-23
FAULT ALARM:
WESTRONICS WS-2000
DS1 CROSSCONNECT:
TELECT 010-2604-0313

23 GHZ 1 DS1 D1 DIGITAL REPEATER
CLIN 0003AG



NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

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CLIN 0003AH MAJOR EQUIPMENT:
RADIO:
MICROWAVE NETWORKS MN-23
DS1 CROSSCONNECT:
TELECT 010-2604-0313
FAULT ALARM:
WESTRONICS

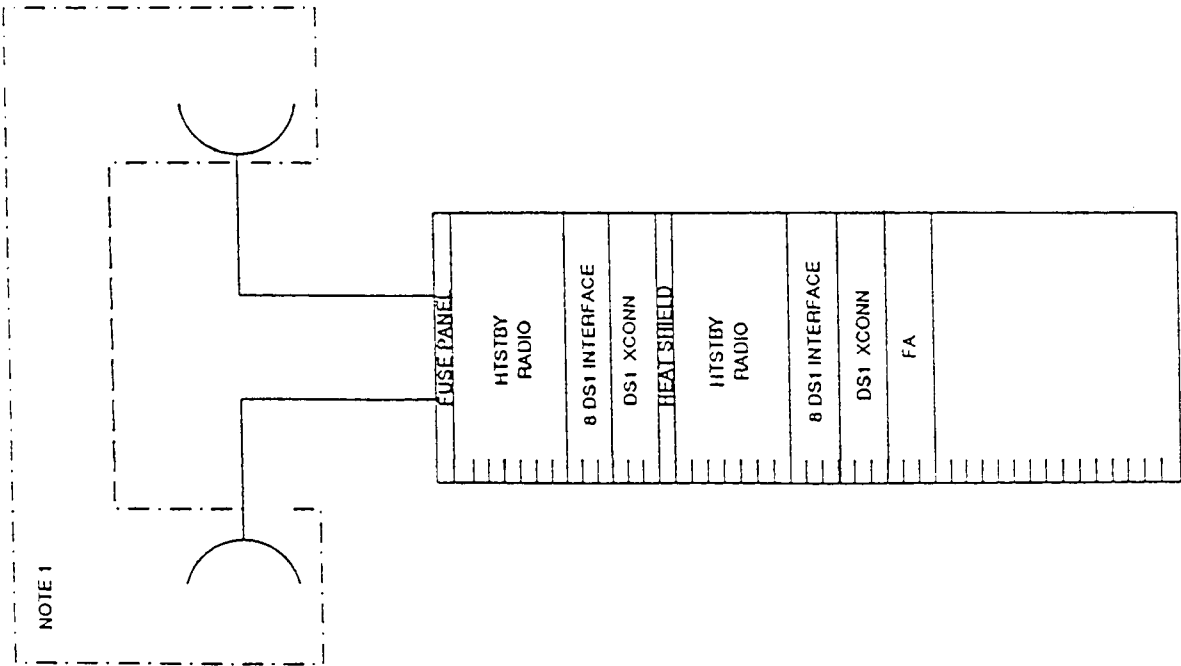
23 GHZ 4 DS1 D1 DIGITAL REPEATER
CLIN 0003AH

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NOTE 1: ANTENNAS AVAILABLE UNDER
SEPERATE CLIN NO.

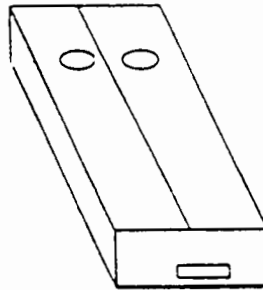


CLIN 0003AJ MAJOR EQUIPMENT
RADIO: MICROWAVE NETWORKS MN 23
DS1 CROSSCONNECT
TELECT 010 2604 0313
FAULT ALARM:
WESTRONICS MODEL WS 2000

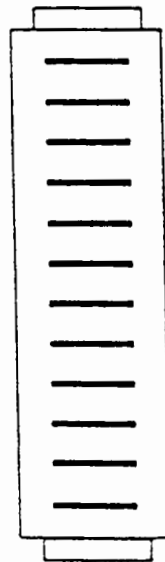
23 GHZ 8 DS1 DIGITAL REPEATER WITH 8 DS1 D/A
CLIN 0003AJ

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NOTE 1: CARD CAGE WILL PROVIDE FOR
CHANNEL CAPACITY OF 1 THRU
12 CHANNELS. CHANNEL CAPACITY
TO BE ORDERED FROM CLIN
NO. 0017AA2



ANALOG CHANNEL CARD
CLIN 0017AA2

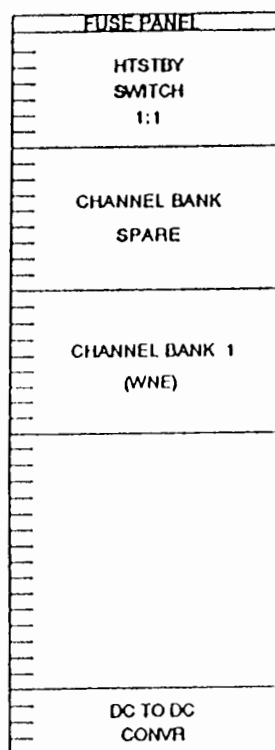


CHANNEL CARD CAGE (WNE)
CLIN 0017AA1

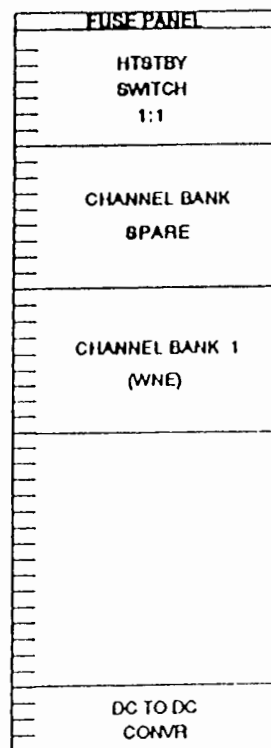
NOTE 1

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NOTE 1: CHANNEL BANK ASSY AVAILABLE
UNDER CLIN NO. 0017AE OR 0017AM



NOTE 1



NOTE 1 1
1

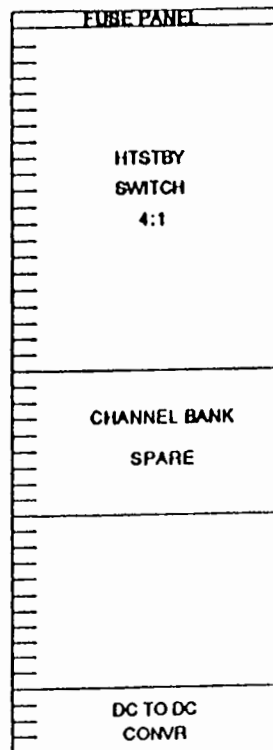
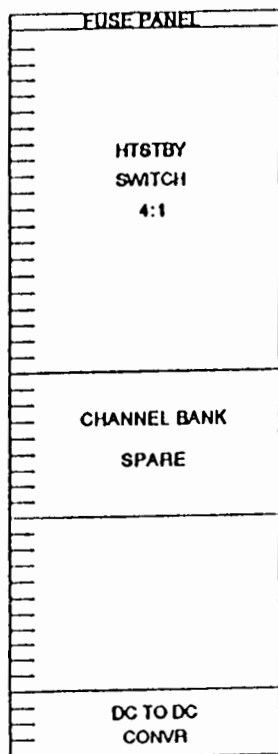
CLIN 0017AB1 MAJOR EQUIPMENT:

CHANNEL BANK SWITCH ASSY:
WESCOM CHARLES IND.
CHANNEL BANK SHELF MODEL 360-24
HTSTBY SWITCH MODEL TBD
COMMON EQUIPMENT MODEL 310300
POWER SUPPLY MODEL 3609-01

LORAIN DC TO DC POWER CONVERTER:
MODEL MZ1ISA15CAB

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1X1 CHANNEL BANK SWITCH ASSY
CLIN 0017AB1



CLIN 0017AB2 MAJOR EQUIPMENT:

CHANNEL BANK SWITCH ASSY::

WESCOM CHARLES INC.

CHANNEL BANK SHELF MODEL 300-24

HTSTBY SWITCH MODEL T80

COMMON EQUIPMENT MODEL 310380

POWER SUPPLY MODEL 3609-01

LORAIN DC TO DC POWER CONVERTER:

MODEL MZ1SA15CAB

1X4 CHANNEL BANK SWITCH ASSY
CLIN 0017AB2

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NOTE 1: CHANNEL BANK ASSY AVAILABLE
UNDER CLIN NO. 0017AE OR 0017AM

| FUSE PANEL | FUSE PANEL |
|-------------------------|-------------------------|
| CHANNEL BANK SPARE | HTSTBY SWITCH 8:1 |
| CHANNEL BANK 1 (WNE) | |
| CHANNEL BANK 2 (WNE) | |
| CHANNEL BANK 3 (WNE) | |
| DC TO DC CONVR | |

NOTE 1

| FUSE PANEL | FUSE PANEL |
|-------------------------|-------------------------|
| HTSTBY SWITCH 8:1 | CHANNEL BANK SPARE |
| | CHANNEL BANK 1 (WNE) |
| | CHANNEL BANK 2 (WNE) |
| | CHANNEL BANK 3 (WNE) |
| | DC TO DC CONVR |

NOTE 1

CLIN 0017AB3 MAJOR EQUIPMENT:

CHANNEL BANK SWITCH ASSY::

WESCOM CHARLES IND.

CHANNEL BANK SHELF MODEL 360-24

HTSTBY SWITCH MODEL TBD

COMMON EQUIPMENT MODEL 310300

POWER SUPPLY MODEL 3600-01

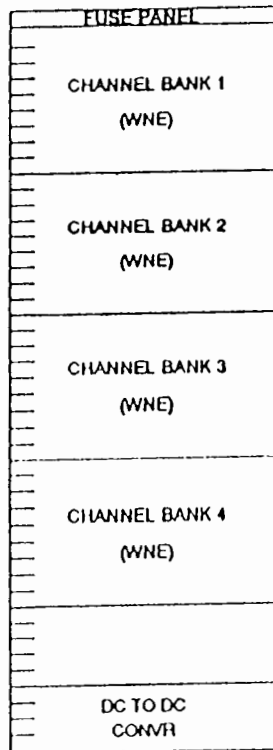
LORAIN DC TO DC POWER CONVERTER:

MODEL MZ1SA15CAB

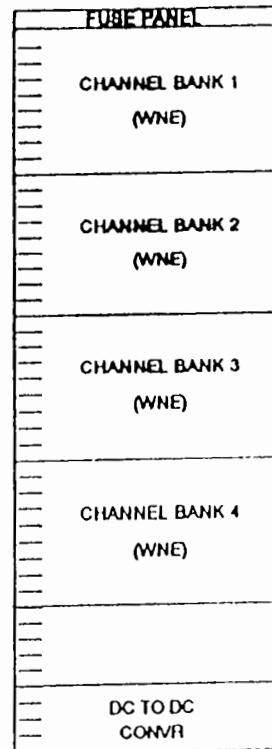
1x8 CHANNEL BANK SWITCH ASSY

CLIN 0017AB3

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NOTE 1



NOTE 1

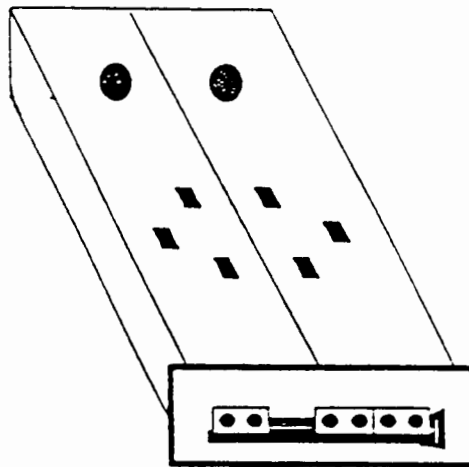
NOTE 1: CHANNEL BANK ASSY AVAILABLE
UNDER CLIN NO. 0017AE OR 17AM

CLIN 0017AC1 MAJOR EQUIPMENT:
CHANNEL BANK SWITCH ASSY::
WESCOM CHARLES IND.
CHANNEL BANK RACK-WNE
LORAIN DC TO DC POWER CONVERTER:
MODEL MZ15A15CAB

CHANNEL BANK RACK-WNE
CLIN 0017AC1

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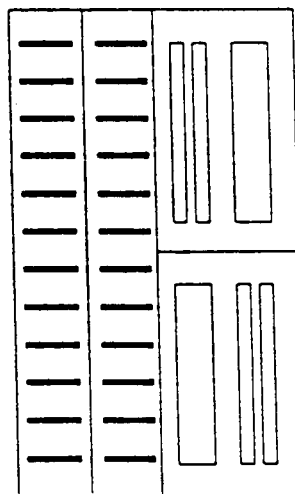
4-WIRE E&M CHANNEL UNITS WITH JACKS

CLIN 0017AD

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CLIN 0017AF MAJOR EQUIPMENT:

CHANNLL BANK:
WESCOM CHARLES IND.
CHANNEL BANK SHELF MODEL 360-24
VOICE CARDS MODEL 3652-61
COMMON EQUIPMENT MODEL 31Q380
POWER SUPPLY MODEL 3609-01

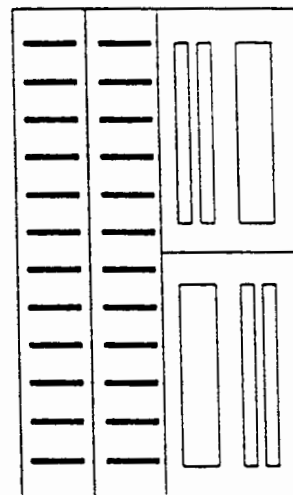


CHANNEL BANK ASSY

CLIN 0017AF

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CHANNEL BANK ASSY

CLIN 0017AM

CLIN 0017AM MAJOR EQUIPMENT:
CHANNEL BANK:
WESCOM CHANNELS INC.
CHANNEL BANK SHELF MODEL 360-24
VOICE CARDS MODEL 3652-61
COMMON EQUIPMENT MODEL 31G380
POWER SUPPLY MODEL 3609-01

